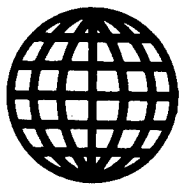


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# ***JPRS Report***

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# **Science & Technology**

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## SCIENCE &amp; TECHNOLOGY

## CHINA

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FIRST PRC COMMUNICATIONS SATELLITE IN ORBIT 3 YEARS

Beijing GUANGMING RIBAO in Chinese 17 Apr 87 p 1

[Article by staff reporter Liu Jingzhi [0491 2417 2535]]

[Text] China's first experimental communications satellite, launched on 8 April 1984 and placed in its designated orbit on 16 April the same year, has now functioned normally in a geostationary orbit for 3 years. It has successfully carried out all the experiments and tests and met the target of a 3-year service life as it was designed for.

In the 3 years, the satellite has been used successfully for digital and analogue telephone transmission, television and radio broadcasts, format facsimile, data and graphic transmission, and many other experiments and tests. It has received favorable comments from such customers as the Ministry of Radio and Television, the Signals Department of the PLA General Staff Headquarters, the Ministry of Water Resources and Electric Power, and the XINHUA News Agency. The Ministry of Radio and Television has conducted trial television transmissions to Urumqi, Lhasa, and other remote border areas via the communications satellite. The pictures, colors, and sounds have all met the designed requirements. The Ministry of Water Resources and Electric Power has begun transmitting telephone calls via the satellite between its Beijing communications station and its communications stations in Guangzhou, Nanning, and Chengdu, and between the Guangzhou and Nanning stations, thus solving the difficult communication problem in regulating power supplies. News on the recently held Fifth Session of the Sixth NPC and the Fifth Session of the Sixth CPPCC were promptly transmitted to Xinjiang, Xizang, and other remote regions via the satellite.

The 3 years of experiments and trial uses have subjected the various systems and tens of thousands of electronic components in the satellite to rigorous tests, and have obtained reliable data and accumulated valuable information for China to develop large-capacity and long-lasting communications and broadcasting satellites.

During the experiment period, tests have been conducted on expanding the satellite's transmission capacity. It has been proven that the capacity of the original transmission channels can be increased more than fivefold.

At present, all the systems on the satellite are functioning normally and will continue to perform television and telephone transmission and other services in its geostationary orbit.

PRC CATCHING UP IN ELASTICITY OF GASES RESEARCH

Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 17 May 87 p 4

[Text] Research in elasticity of gases, until recently considered feasible only in developed countries, has produced numerous results in China. One of the results, involving the "calculation of stall-related buffeting boundaries," is up to international levels.

Elasticity of gases is a recently developed, highly practical frontier science. Great importance is attached to it in engineering and academic circles worldwide.

According to a GUANGMING RIBAO report, although China had a late start in elasticity of gases research, a nationwide research system involving space, metallurgical, communications, architectural, and many other fields has been formed. In 1984, China presented for the first time three research papers to an international academic symposium. Research has developed in depth in the past few years. Of the academic papers approved for presentation at the fourth international academic symposium to be held in West Germany in September this year, one-fourth are from China.

Calculation of stall-related buffeting boundaries is an important theoretical basis for engine designing. Beijing Aeronautical Engineering College's Professor Zhou Sheng [6650 4141] and his graduate students succeeded in 1983 and 1984 in calculating "subsonic/transonic stall buffeting boundaries" and "subsonic choking vibration boundaries" and improved the method of calculating "supersonic stall buffeting boundaries" developed by U.S. scientists in 1980. Their work is highly regarded in academic circles at home and abroad. In view of the important contributions made by Chinese scientists in this field, it has been decided that the "fifth international academic symposium on impeller machinery aeroelasticity" will be sponsored by China's Beijing Aeronautical Engineering College.

12802/12951  
CSO: 4008/63



PANEL METHOD FOR PREDICTING DYNAMIC STABILITY DERIVATIVES OF OSCILLATING WING IN HIGH SUBSONIC FLOW

Mianyang KONGQIDONGLIXUE XUEBAO [ACTA AERODYNAMICA SINICA] in Chinese Vol 5 No 2, Jun 87 pp 97-102

[English abstract of article by Zhuang Lixian [8369 4409 6343], et al., of the University of Science and Technology of China]

[Text] In this paper, the pitching and rolling damping derivatives of several different shaped wings in high subsonic flow are calculated using the so-called "Locally-Linearization-Transonic-Panel-Method" developed by the authors in an earlier paper. The calculated results are compared to the experimental data available and prove to be in good agreement. The results of the present method are also compared to those of the purely linearized method. It is determined that the nonlinear effect is not negligible in general for predicting the dynamic derivatives when the critical Mach number is approached. In this calculation, the necessary steady flow solutions are obtained from the authors' "Iterative-Panel-Method" which was developed for predicting the steady pressure distribution on the wing surface in transonic/subsonic flow.

The present method is proven to be very cost effective.

9717

CSO: 4009/69

OPTIMAL DESIGN OF MINIMUM DRAG HYDRODYNAMIC SHAPES

Mianyang KONGQIDONGLIXUE XUEBAO [ACTA AERODYNAMICA SINICA] in Chinese Vol 5  
No 2, Jun 87 pp 103-109

[English abstract of article by Yang Baoan [2799 0202 1344] of Northwestern Polytechnic University]

[Text] The present paper introduces a computer aided design [CAD] and optimization method for deeply submerged shapes in a viscous fluid under parallel inflow conditions. Their total viscous drag is to be minimized subject to a variety of possible geometric constraints.

The CAD procedure includes three models: the hydrodynamic model based on potential flow, boundary layer calculations and separation drag estimation, the shape variation model using B-spline curve representations and the optimization model which relies on nonlinear programming strategies. The procedure is demonstrated by a NACA 0012 airfoil optimization example and by a brief application to axisymmetric shapes.

Much of the work reported in this paper is based on the methodology presented by Jonas.

9717

CSO: 4009/69

TWO-DIMENSIONAL SUBSONIC AND TRANSONIC WIND TUNNEL WALL INTERFERENCE  
CORRECTIONS FOR VARIED WALLS

Mianyang KONGQIDONGLIXUE XUEBAO [ACTA AERODYNAMICA SINICA] in Chinese Vol 5  
No 2, Jun 87 pp 132-140

[English abstract of article by Zhang Qiwei [1728 0366 1218] of Nanjing  
Aeronautical Institute]

[Text] Two-dimensional subsonic and transonic wall interference corrections are evaluated from experimental pressure distributions near the tunnel walls and aerodynamic forces on the model. The corrections can be used for both ventilated and solid walls. The knowledge of wall cross-flow properties is not required. Different equations are used for different Mach number ranges. Two methods are provided to suit different needs. One method is a fast computing method which can be used while the flow near tunnel walls is sub-critical. The other is a finite difference method which can be used in both subsonic and transonic tests and can judge whether the test data are correctable. Two practical examples are given, and the effect of using different equations on the computing results is shown.

9717

CSO: 4009/69

EXPERIMENTAL INVESTIGATION OF DELTA WINGS WITH LEADING-EDGE VORTEX SEPARATION

Mianyang KONGQIDONGLIXUE XUEBAO [ACTA AERODYNAMICA SINICA] in Chinese Vol 5  
No 2, Jun 87 pp 141-147

[English abstract of article by Li Jingbai [2621 0079 2672], et al., of  
Nanjing Aeronautical Institute]

[Text] Low speed wind tunnel tests have been carried out for five delta wings with leading-edge vortex separation. The effects of variations in the leading-edge swept-back angle on the vortex core trajectory, vortex burst point, vortex core circulation and relative sink strength have been investigated using a seven-hole probe up to high angles of attack. The experimental results of the present paper are compared with Erickson's results by means of other measuring methods and are fairly satisfactory. Therefore, the seven-hole probe is a new, simple, convenient and accurate measuring tool for flow studies of separated vortices.

9717

CSO: 4009/69

DEVELOPMENT OF EXPERIMENTAL INVESTIGATION OF TRANSONIC WIND TUNNEL WALL INTERFERENCE

Mianyang KONGQIDONGLIXUE XUEBAO [ACTA AERODYNAMICA SINICA] in Chinese Vol 5 No 2, Jun 87 pp 181-187

[English abstract of article by Huang Yiyi [7806 1150 5639] of Nanjing Aeronautical Institute]

[Text] This paper introduces the development of experimental investigations of the transonic wind tunnel wall interference and provides some quantitative results. Some comments on the recently developed wall interference correcting methods using measured wall pressure are given. The problems which should be noticed and have not yet been solved are pointed out. A feasible program for reducing tunnel wall interference is discussed, and an appropriate technique for tunnel wall interference investigation is proposed. The conclusions are believed to be useful in improving the design of transonic wind tunnel and model tests.

9717

CSO: 4009/69

# SINGLE FREQUENCY TE CO<sub>2</sub> LASER

Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 7, No 3, Mar 87  
pp 212-215

[Article by Cao Hongru [2580 3163 1172], Wang Huasheng [3769 5478 0524], Chen Yongrong [7115 3057 2837], Che Mingyu [6508 2494 3842], and Hu Xuejin [5170 7185 6855] of the Anhui Institute of Optics and Fine Mechanics; received 13 November 1985, revised paper received 9 June 1986]

[Text] Abstract: This paper presents the first application of methods to shorten cavity length and appropriately reduce total pressure obtaining single frequency output in a transverse excited (TE) high-pressure CO<sub>2</sub> laser. The laser cavity length was 14 cm with activating length 10 cm, pressure 240 Torr, and single frequency output energy 7 mJ.

## I. Introduction

In several basic research areas such as laser chemistry, laser spectroscopy, and nonlinear optics as well as optically pumped far infrared lasers, it is necessary to use high peak power light sources with good monochromaticity and optical energy regularly distributed in space and time. Single frequency TE CO<sub>2</sub> lasers are capable of providing just this sort of high quality laser beam.

In a transverse excited high pressure CO<sub>2</sub> laser, TEM<sub>00</sub> mode operation can be achieved by making the discharge uniform and selecting the appropriate diaphragm. However, attaining single frequency operation is no easy matter. The longitudinal and transverse spacing of a TE high-pressure CO<sub>2</sub> laser is 150 MHz and the gain width of a total pressure of 400 Torr is about 1.6 GHz. This means that there can be multiple longitudinal and transverse frequency oscillations simultaneously. There have been developed several methods to produce single frequencies such as using a saturable absorber within the cavity, paired unstable cavities, and mixed systems using low pressure and high pressure.[1] However, all these methods involve device structure complications huge volumes (e.g., a mixed system is generally 3 to 4 m long), and entail certain difficulties in adjustment and operation. This paper is the first to utilize a simple method with compressed cavity length and appropriately lowered pressure to ensure the device's single frequency output, making progress toward simplification and miniaturization.

## II. Experimental Apparatus and Device Design

In order to obtain uniform non light thread discharge in a discharge area as short as 10 cm (see Figure 1 discharge photograph) [photograph not reproduced], we used T.Y. Chang's surface type brass electrodes.[2] The electrodes, 10 cm long and 2 cm wide, were separated by 6 mm, and surface polished. Simultaneously we used Blumlein's rapid discharge circuit (Figure 2) with surface areas of the copper plates to the left and right being 50 X 10 cm<sup>2</sup> and six layers of an 0.1 mm thick polyester film insulation between the upper and lower plates (represented in the figure by the broken line). One head of the spark sphere gap is connected to the upper plate and one head is connected to the lower plate to minimize self-inductance. Storage capacitor C is an 8,000 pF high voltage pulse capacitor and resistor R is 15 k $\Omega$ . In order to obtain even more uniform discharge, two chunks of copper foil and the left electrode are connected together and inserted at the boundaries of the two electrodes. In addition we used an 0.1 mm thick polyester film and another electrode insulator (the solid lines in the figure represent the copper foil and the dashed lines stand for the polyester film). When the spark sphere gap conducts, the corona discharge of the copper foil and the right electrode make the primary discharge zone be preionized. In the discharge photograph of Figure 1, the light threads of the upper and lower sides is the discharge of this corona. This sort of preionization is simple in structure, does not require any coupling components, and connects directly with the electrode.

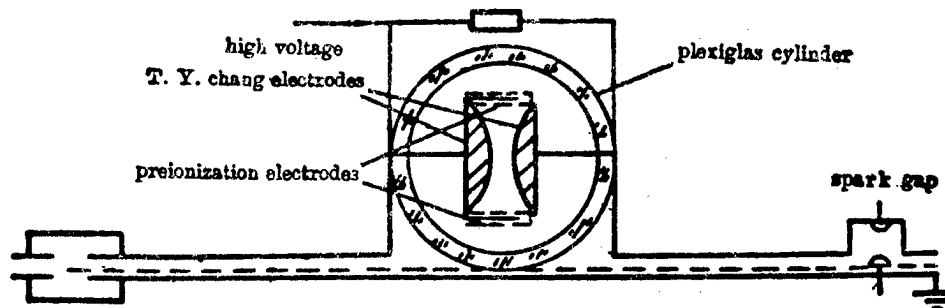


Figure 2. Discharge Circuit of the Experimental Apparatus

A suitably lowered working pressure makes it so that there is only one longitudinal transverse oscillation within one gain line width. Simple computations show that when the cavity length is 14 cm the longitudinal transverse spacing,  $\Delta\nu = 1.07$  GHz. The gas mix (CO<sub>2</sub>:N<sub>2</sub>:He = 1:1:4) total pressure should be 240 Torr. According to the pressure broadening formula the spectral line width[4]

$$\Delta\nu = 0.5(T/300)^{1/2} [0.59P_{He} + 0.75P_{N_2} + P_{CO_2}] \quad (1)$$

computes to  $\Delta\lambda \approx 1.07$  GHz ( $T = 300$  K). In which  $P_{He}$ ,  $P_{N_2}$ ,  $P_{CO_2}$  are the component pressures at He, N<sub>2</sub>, and CO<sub>2</sub>. Because the activating length is only 10 cm, there is only the P(20) capable of producing oscillation.[3] The use of an infrared spectroscope in experiments also proved this point. This way only one longitudinal mode is output.

In order to achieve larger pattern volume, we used a plano-concave cavity structure with a large radius of curvature. The radius of curvature of the totally reflective mirror is 5 m and the reflectivity of the germanium window is 87 percent. The diameters of the pattern spot on the spherical mirror and on the plane mirror are:[5]

$$\phi_1 = 2 \left( \frac{\lambda L}{\pi} \right)^{1/2} \left[ \frac{R^3}{L(R-L)} \right]^{1/4}, \quad (2)$$

$$\phi_2 = 2 \left( \frac{\lambda L}{\pi} \right)^{1/2} \left[ \frac{R-L}{L} \right]^{1/4}, \quad (3)$$

in which  $\lambda$  is the laser wave length,  $L$  is the cavity length, and  $R$  is the spherical radius of curvature. From our experimental parameters we computed  $\phi_1 \doteq 3.45$  mm and  $\phi_2 \doteq 3.39$  mm. Using a 4.3 mm diameter diaphragm inside the laser cavity 5 mm from the spherical mirror, TEM<sub>00</sub> mode output can be obtained.

### III. Experimental Results and Single Frequency Detection

In order to obtain TE CO<sub>2</sub> laser single frequency output, the laser must be made to operate in a single longitudinal and transverse mode. Based on the above computations we selected a mixed gas of CO<sub>2</sub>:N<sub>2</sub>:He = 1:1:4 and total pressure 240 Torr. The spherical mirror radius of curvature was 5 m, the diaphragm diameter 4.3 mm, and the excitation voltage 12 kV. An AC15/5 direct current compound ray type galvanometer and an RPM-1 model power meter were used to measure the laser output. Single pulse output power reached 7 mJ. Using an SF-33 model thermal release electronic infrared camera tube combination SGB-5 camera probe and 925 television invigilator we measured the shape of the light spot.[6] The camera tube was about 1 m from the output end of the laser. The TEM<sub>00</sub> mode pattern is given in Figure 3 [photograph not reproduced]. Also, an SBM-14 oscilloscope displayed the light intensity distribution wave shape, a photograph of which appears in Figure 4. This is a close match when compared with the theoretical values of a gaussian distribution.

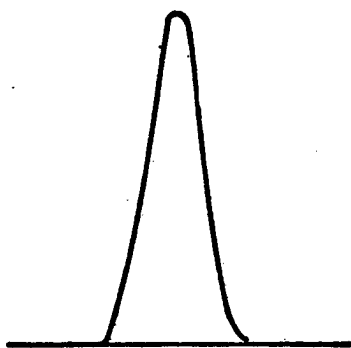


Figure 4. Light Intensity Distribution



We used a CO<sub>2</sub> laser spectral line meter to investigate the output line of the CO<sub>2</sub> laser. At 10.6  $\mu\text{m}$  we found one very bright line which was identified precisely as 10.6  $\mu\text{m}$  P(20). At 9.6  $\mu\text{m}$  there was no sort of bright line discovered. At the same time in the operation process we examined the P(20) stable operation without discovering mode jumping phenomena.

If the pressure increases then there can be two longitudinal modes present within the P(20) gain line width, and supposing that the two longitudinal modes have the same amplitude, that is:

$$E_1 = E(t) \cos(\omega_1 t + \alpha_1), \quad (4)$$

$$E_2 = E(t) \cos(\omega_2 t + \alpha_2), \quad (5)$$

in which  $E(t)$  represents the variation of amplitude with time,  $\omega_1, \omega_2$  are the frequencies of the two longitudinal modes, and  $\alpha_1, \alpha_2$  are their initial phases.

This way the light pulse received by the detector is actually the superposition of two longitudinal modes, i.e.:

$$E_1 + E_2 = 2E(t) \cos(\omega' t + \beta) \cos(\omega t + \alpha), \quad (6)$$

in which  $\omega = (\omega_1 + \omega_2)/2$  is the gain central frequency,  $\omega' = (\omega_1 - \omega_2)/2 = C/(4L)$  is the half longitudinal separation,  $\beta = (\alpha_1 - \alpha_2)/2$ ,  $\alpha = (\alpha_1 + \alpha_2)/2$ . This illustrates that two longitudinal modes operating simultaneously in the detector is equal to the amplitude modulated by frequency  $\omega'$ . This way a modulated wave form will appear on the light pulse wave form of the detector. Conversely, if the laser makes single frequency output, we will capture one smooth light pulse wave form.

We used a P model germanium infrared drag detector (response time < 0.1 ns) and a Textronix 7834 storage oscilloscope to measure the light pulse wave form. The modulation frequency of the amplitude in the experiment (i.e., the half longitudinal mode spacing) was about 1 GHz. The detector was able to respond sufficiently to the light pulse wave form for a modulation at this high a frequency.

Figure 5 shows the light pulse wave form when two longitudinal modes are present. At this time, the operating gas pressure of the CO<sub>2</sub> laser was 460 Torr. From the figure, it is clearly seen that the light pulse wave form has been modulated. When the gas pressure drops to 240 Torr, we obtain the stable light pulse wave form shown in Figure 6. This is a trace of a wave form that has no modulation of any kind.

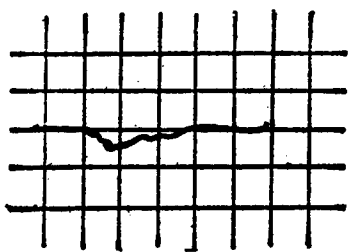


Figure 5. Temporary Laser Pulse Profile of Two Longitudinal Modes.  
Time scale: 20 ns/div

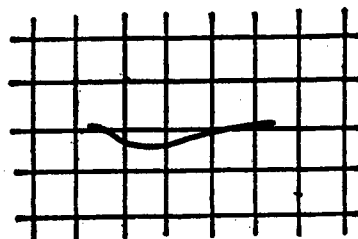


Figure 6. Temporary Laser Pulse Profile of Single Frequency Output.  
Time scale: 20 ns/div

#### IV. Conclusion

We first used compressed cavity length and obtained single frequency output from a simple, dense TE CO<sub>2</sub> laser. Employing this sort of laser as an oscillator, the single frequency output can be further amplified to obtain high energy single frequency laser output. Or, using it as the injection source of an injection style mode locking system, a single frequency mode locked series can be attained. On the basis of these results, by other measures, stable frequency devices can be established.

Zhao Zhensheng [6392 7301 5116], Li Zhaolin [2621 2507 5259], and Yin Baolong [3009 1405 7893] also participated in this work.

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12966/6091

CSO: 4008/72

RESONANT RADIATION OF ATOM EXCITED BY LASER PULSE TRAINS

Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 7 No 4, Apr 87  
pp 300-310

[English abstract of article by Zhang Weiping [1728 5898 1627] of Anhui Institute of Optics and Fine Mechanics, Chinese Academy of Sciences; and Tan Weihai [6223 4850 5060] of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences]

[Text] This paper discusses a solution of the Bloch equations of a two-level atom resonantly interacting with laser pulse trains in detail. In terms of the solution, the authors calculate the radiation spectrum of the two-level atom excited by the laser pulse trains and obtain the following results: (1) for atoms satisfying the condition  $K_1/K = 1$  (such as gas atoms broadened by spontaneous emission), the laser pulse trains are almost equivalent to those of a CW laser; (2) for the atoms  $K_1/K \ll 1$ , i.e., some solid atoms like ruby, the radiation spectrum of the atom exhibits a multipeak structure induced by the strong interaction of the atom with the side frequency components of the laser pulse trains.

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CSO: 4009/63

INVESTIGATIONS OF PICOSECOND CHL DYE LASERS

Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 7 No 4, Apr 87  
pp 289-294

[English abstract of article by Liu Yixian [0491 0001 0341], et al., of the Department of Physics, Fudan University, Shanghai; Yang Shanyuan [2799 0810 0337] of Shanghai Institute of Plant Physiology; Zhou Peilin [0719 1014 2651] of the Department of Biology, Fudan University, Shanghai]

[Text] The experimental set-up of a red picosecond pulse output from an ultra-short cavity dye laser pumped by the third harmonic from a colliding pulse mode-locked Nd:YAG laser is reported and the experimental results are presented in this paper. The dependences of the output laser wavelengths of chl a and b in different aggregations in solutions on the dye concentrations are studied. As the chl a-ethanol solution with a concentration of  $2 \times 10^{-3}$  M and the length of the laser cavity becomes less than 36  $\mu\text{m}$ , a single mode-tunable ps pulse train can be obtained. The divergence angle of the laser beam is about 60 mrad.

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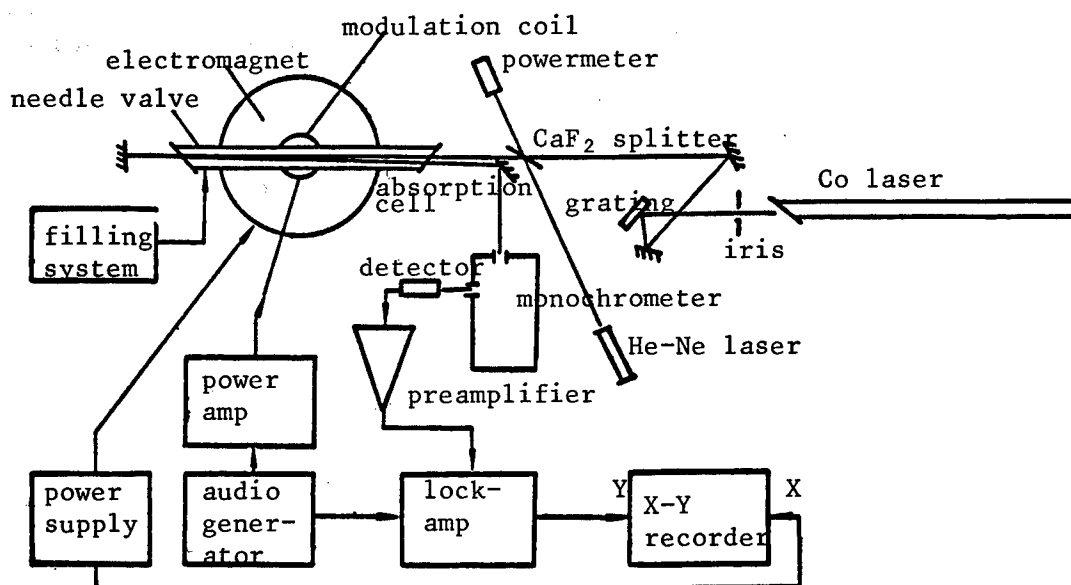
CSO: 4009/63

CO LASER MAGNETIC RESONANCE USED FOR QUANTITATIVE DETECTION OF NO<sub>2</sub>

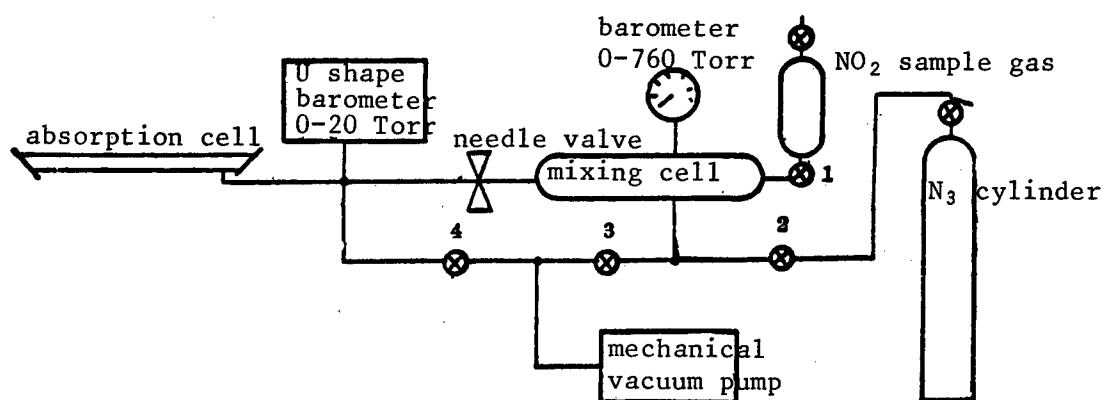
Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 7 No 4, Apr 87  
pp 335-340

[English abstract of article by Li Fengyan [2621 1144 1693], et al., of Wuhan Institute of Physics, Chinese Academy of Sciences]

[Text] An apparatus of CO laser magnetic resonance used for quantitative detection of the NO<sub>2</sub> molecule is described in this paper. The mathematical expression of the LMR signal is given. The dependence of the LMR signal on the molecular concentration and laser power is studied. The experimental studies are in agreement with the theoretical analysis.



Block diagram of the experimental apparatus



Block diagram of gas filling system

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CSO: 4009/63

THEORETICAL ANALYSIS OF PULSE MODULATION OF SEMICONDUCTOR LASERS

Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 7 No 5, May 87  
pp 415-420

[English abstract of article by Xu Baoxi [6079 1405 6007], et al., of the  
Department of Technical Physics, Northwest Telecommunications Engineering  
Institute, Xi'an]

[Text] Rate equations of Gaussian shape pulse modulated semiconductor  
lasers are solved by the Runge-Kutta method, and the results are analyzed.  
The formulas for calculating the delay time, pulse width of the laser pulse  
and maximum bit-rate of the Gaussian shape pulse modulation are derived.  
The experimental results of the modulation pattern effects are given.

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CSO: 4009/68

VARIATIONAL ANALYSIS OF DUAL-CHANNEL DIELECTRIC DIRECTIONAL COUPLERS

Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 7 No 5, May 87  
pp 421-425

[English abstract of article by She Shouxian [0152 1343 2009], et al., of  
Northern Jiaotong University, Beijing]

[Text] In this paper the coupling characteristics of a dielectric directional coupler consisting of two parallel rectangular waveguides are analyzed. The authors make use of variational analysis to obtain the coupling length. It is shown that this technique is much more accurate than the widely-used Marcatili's method or the perturbation method. By means of this method the coupling length can be easily calculated with high accuracy, and it can be extended to the analysis of other devices in integrated optics.

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CSO: 4009/68



## DYNAMIC MONITORING SYSTEM FOR FIBER COUPLER MANUFACTURE

Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 7 No 5, May 87  
pp 426-429

[English abstract of article by Zhou Shuquan [0719 2579 6898], et al., of  
the Department of Physics, Shanghai University of Science and Technology]

[Text] This paper describes the authors' dynamic monitoring system for fused fiber coupler manufacturing. By using the time delay technique the system can not only indicate accurately by digital display the static power-splitting ratio of the fiber coupler, but also control the power-splitting ratio change during the process of fiber coupler manufacturing, thereby increasing the finished productivity of the fiber coupler.

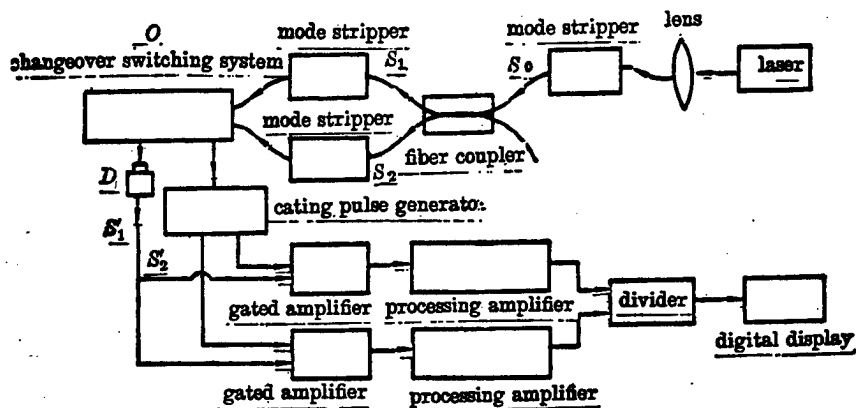


Fig. 1 Experimental arrangement

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CSO: 4009/68

DEFOCUS CALCULATION IN HIGH-SPEED FRAMING CAMERA WITH ROTATING MIRROR

Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 7 No 5, May 87  
pp 453-457

[English abstract of article by Lu Zengpei [7120 1073 1014] of Suzhou Optical  
Instrument Factory]

[Text] Based on defocusing and non-coaxality induced by framing lenses in an  
approximate circle, the precise formulas for calculating the defocusing of  
image points in the film in another approximate circle are deduced in this  
paper. Errors caused by the traditional calculating method have been  
eliminated and more reliable data can be obtained for the evaluation of the  
image quality in a rotating mirror framing camera.

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CSO: 4009/68

ELECTRON TRANSPORT AND SUPERCONDUCTING THERMODYNAMIC PROPERTIES OF METALLIC GLASS  $Zr_{66.7}Ni_{33.3}$

Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS] in Chinese Vol 9 No 1, Mar 87 pp 10-16

[English abstract of article by Zhao Yong [6392 0516], et al., of the Department of Physics, University of Science and Technology of China, Hefei]

[Text] The values of the electronic density of states at the Fermi level, Debye temperature and the electron-photon coupling constant for metallic glass  $Zr_{66.7}Ni_{33.3}$  have been obtained by measuring the resistivity, superconducting critical temperature and upper critical field. It has been found that  $\rho(T)$  is in agreement with the generalized Ziman theory in the temperature region of 77-300 K qualitatively, but an obvious deviation appears in quantitative analysis. The behavior of  $H_{c2}$  is considerably influenced by such effects as the spin paramagnetism and the spin-orbit scattering. The superconducting fluctuation has also been observed. The authors suggest that the deviations from the generalized Ziman theory are made by the single-phonon scattering at high temperatures, and by the spin-orbit scattering at low temperatures. The notable effects of the spin paramagnetism and spin-orbit scattering come from the strong atomic topological and chemical short range order in the sample.

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CSO: 4009/73

LOW TEMPERATURE MAGNETIC PROPERTIES OF  $\text{Gd}_3\text{Ga}_{4.5}\text{Al}_{0.5}\text{O}_{12}$  SINGLE CRYSTAL

Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS] in Chinese Vol 9 No 1, Mar 87 pp 32-36

[English abstract of article by Liu Pinqing [0491 0756 3237] of the Cryogenics Laboratory, Chinese Academy of Sciences, Beijing]

[Text]  $\text{Gd}_3\text{Ga}_{4.5}\text{Al}_{0.5}\text{O}_{12}$  single crystal has been grown using the Czochralski technique. It was identified as a parent single phase material by X-ray diffraction. The experimental studies of the magnetization and susceptibility of  $\text{Gd}_3\text{Ga}_{4.5}\text{Al}_{0.5}\text{O}_{12}$  were made under the temperature range of 1.5 to 77 K. It is compared with  $\text{Gd}_3\text{Ga}_5\text{O}_{12}$  (GGG). The primary results show that the susceptibility of this new material obeys the Curie-Weiss Law when the magnetic field is below 500 (Oe), and that the ordering temperature is far below 1.5 K. The magnetization of GGAG is obviously about 4 percent higher than that of GGG when  $H > 1 \times 10^4$  Oe. The critical magnetic fields of GGAG available are about  $4 \times 10^3$  Oe higher than those of GGG.

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CSO: 4009/73

EFFECT OF OXYGEN AND CARBON ON  $T_c$  AND  $\rho(T)$  OF SPUTTERED B1 STRUCTURE  $VN_x$  FILMS

Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS] in Chinese Vol 9 No 1, Mar 87 pp 37-41

[English abstract of article by Zhao Bairu [6392 2672 0320], et al., of the Institute of Physics, Chinese Academy of Sciences, Beijing]

[Text] Measurements of the superconducting transition temperature  $T_c$  (inductive and resistive) and resistivity  $\rho(T)$  from  $T_{conset}$  to 300 K have been made on several typical sputtered B1 structure  $VN_x$  films. X-ray diffraction, Auger and XPS techniques are used for analysis of these specimens. The results show that  $T_c$  and  $\rho(T)$  change with the thickness and concentration of oxygen and carbon of the films. The authors postulate that perhaps oxygen plays a role in causing more vacancies in the B1 structure and sequentially suppresses  $T_c$ , leading to the hopping mode conduction of the electrons.

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CSO: 4009/73

FABRICATION AND TEM STUDIES OF  $\text{Nb}_3\text{Sn}$  FILMS FORMED BY NEW SIMPLE COEVAPORATION TECHNIQUE

Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS] in Chinese Vol 9 No 1, Mar 87 pp 42-48

[English abstract of article by Zhang Jinlong [1728 6855 7893], et al., of the Solid State Physics Institute, Physics Department, Beijing University]

[Text] A new kind of superconducting compound,  $\text{Nb}_3\text{Sn}$  thin films, has been fabricated successfully using a new simple coevaporation technique. The superconducting transition temperature of the films is 18 K.  $\text{Nb}_3\text{Sn}$ -Pb Josephson tunnel junctions made of the films for base electrodes are shown to have the typical DC I-V characteristic curves. The energy gap value of the  $\text{Nb}_3\text{Sn}$  films is found to be 3.1 MeV by measurement. TEM observation and analysis indicate that the high  $T_c$   $\text{Nb}_3\text{Sn}$  film formed by the technique is a mono-phase A15 type superconducting compound. It possesses the basic features contained in microstructures of A15 type superconducting compounds formed by coevaporation. Two-dimensional lattice strip figures in a large scale (500 Å) have been observed by HREM.

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CSO: 4009/73

AC LOSSES OF MULTIFILAMENTARY SUPERCONDUCTING NbTi/Cu COMPOSITE CONDUCTOR

Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS] in Chinese Vol 9 No 1, Mar 87 pp 49-54

[English abstract of article by Yang Qiansheng [2799 0051 5116], et al., of the Institute of Physics, Chinese Academy of Sciences, Beijing]

[Text] The authors have measured the dynamic and static magnetizations of the multifilamentary superconducting NbTi/Cu composite conductor in longitudinal and transverse fields, obtaining low frequency AC losses of the conductor in magnetic fields up to 60 kOe. The results from the static method are consistent with those of the hysteretic model. The dynamic results include the hysteretic losses and eddy losses induced by the coupling among the filaments. The losses in the longitudinal field are lower than those in the transverse field due to the difference in the geometry and the anisotropy of the pinning forces.

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CSO: 4009/73

WU-LEE CRITERION OF FREE ELECTRON LASER INSTABILITY

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS]  
in Chinese Vol 7 No 2, Jun 87 pp 65-72

[English abstract of article by Ding Ning [0002 1337], et al., of Southwestern  
Institute of Physics, Leshan, Sichuan]

[Text] Based on the linear Vlasov theory, the propagation of a tenuous electron beam in the  $z$ -direction through a helical wiggler field,  $B_0 = -\hat{B}\cos k_0 z \hat{x} - \hat{B}\sin k_0 z \hat{y}$ , is studied. The dispersion relation and resonance conditions are derived. It is shown that there exists some differences between the relativistic resonance condition in momentum space and that in velocity space. For a right-circularly polarized electromagnetic wave, the instability is analyzed using the Wu-Lee criterion. It is revealed that the Wu-Lee criterion can be applied for qualitatively analyzing the free electron laser instability, resulting in the same results for momentum space as for velocity space.

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CSO: 4009/70



METHOD FOR SOLVING X-RAY SPECTRA IN LASER FUSION

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS]  
in Chinese Vol 7 No 2, Jun 87 pp 82-86

[English abstract of article by Liu Chenghai [0491 2052 3189], et al., of the  
Institute of Applied Physics and Computational Mathematics, Beijing]

[Text] In this paper an interactive method with amplitude-limiting and periodic smoothing techniques has been developed based on the SAND iteration. It has been used to solve the X-ray spectra in laser fusion and satisfactory results have been obtained. This method can solve the X-ray spectra from the data of sub-keV X-ray spectrometers, multi-channel k-edge filtering spectrometers and multi-channel filtering fluorescence spectrometers. The computational results show that numerical instability is suppressed completely, and non-physical "negative spectra" and numerical structure in the computed X-ray spectra are eliminated by means of this method. The computational results are independent of the initial trial spectrum.

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CSO: 4009/70

QUASI-PHYSICAL METHOD FOR SOLVING THREE-DIMENSIONAL PACKING PROBLEM

Beijing YINGYONG SHUXUE XUEBAO [ACTA MATHEMATICAE APPLICATAE SINICA]  
in Chinese Vol 9 No 4, Oct 86 pp 443-453

[English abstract of article by Huang Wenqi [7806 2429 1142], et al., of  
Huazhong University of Science and Technology]

[Text] The principal difficulty in tackling the three-dimensional packing problem lies in the fact that the "squeezing elastic potential energy" defined in reference [1] cannot be calculated practically. In this paper the difficulty is overcome in a way similar to the finite element method, and a feasible algorithm is given.

The algorithm possesses a polynomial complexity in many cases, and can be used to fulfill many geometrical distribution tasks, especially instrument installation in a rocket cabin, highly automatically. (Paper received 10 Aug 84.)

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CSO: 4009/1110

UNIQUE DECODABILITY OF LINEAR CODES FOR MULTIPLE-ACCESS ADDER CHANNELS

Beijing YINGYONG SHUXUE XUEBAO [ACTA MATHEMATICAE APPLICATAE SINICA]  
in Chinese Vol 9 No 4, Oct 86 pp 470-478

[English abstract of article by Meng Qingsheng [1322 1987 3932] of Xi'an  
Jiaotong University; Yu Jinghuan [0131 2417 3562] of Shenzhen University]

[Text] In the coding of multiple-access adder channels, the essential  
problem is the unique decodability. In reference [1], the conditions of  
unique decodability are given for users with only two codes.

In this paper, the authors give the sufficient and necessary conditions of  
unique decodability of linear block codes and convolutional codes for two  
access adder channels and sufficient conditions for multiple access adder  
channels. (Paper received 29 Aug 84.)

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CSO: 4009/1110

RANDOM WEIGHTING METHOD

Beijing YINGYONG SHUXUE XUEBAO [ACTA MATHEMATICAE APPLICATAE SINICA]  
in Chinese Vol 10 No 2, Apr 87 pp 247-256

[English abstract of article by Zheng Zhongguo [6774 1813 0948] of Beijing University]

[Text] In this paper, the random weighting method is considered for computing the distribution of the error of the sample mean. In estimating the variance of the error of the sample mean, the variance of the random weighting distribution is considered. It is shown that for most population distributions, this random weighting estimate is better than the bootstrapping estimate in small sample cases. Finally, the large sample property of the random weighting method is considered and it is proved that this method is asymptotically valid. (Paper received 27 Jun 86.)

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CSO: 4009/1112

SYNTHESIS OF  $\text{ZnO-SrO-SiO}_2$  PHOSPHORS ACTIVATED BY  $\text{Tb}^{3+}$  ION

Changchun YINGYONG HUAXUE [CHINESE JOURNAL OF APPLIED CHEMISTRY] in Chinese  
Vol 4, No 1, Feb 87 pp 67-69

[English abstract of article by Li Bin [2621 1755], Bai Yubai [4101 3768 4101], Wang Yuru [3769 7161 5423] of the Department of Chemistry, Jilin University, and Zhao Chunyan [6392 2504 3601] of Changchun Health School]

[Text] Luminophores of  $(\text{Zn-Sr})_2\text{SiO}_4:\text{Tb}^{3+}$  were synthesized at high temperature using  $\text{SrCO}_3$ ,  $\text{ZnO}$ ,  $\text{SiO}_2$ ,  $\text{Li}_2\text{CO}_3$  and  $\text{Tb}_2(\text{C}_2\text{O}_4)_3$  as raw materials. Optimum conditions, judged by the relative intensity of illumination, were found by orthogonal design, i.e.  $1200^\circ\text{C}$ ,  $\text{Zn}:\text{Sr} = 0.75:0.25$ ,  $\text{SiO}_2 = 3.0$  mol,  $\text{Tb} = 0.1$  mol. The properties of the product has been examined by means of x-ray powder diffraction and fluorescent spectra. (Paper received 20 December 1985, finalized 21 April 1986.)

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CSO: 4009/1127

EPOXY RESIN TOUGHENED BY HYDROXY-TERMINATED BUTADIENE-ACRYLONITRILE COPOLYMER--  
METHOD BASED ON ISOCYANATE-TERMINATED PREPOLYMER

Changchun YINGYONG HUAXUE [CHINESE JOURNAL OF APPLIED CHEMISTRY] in Chinese  
Vol 4, No 1, Feb 87 pp 18-21

[English abstract of article by Han Xiaozu [7281 1321 2469], Guo Fengchun [6753 7364 2504], Wang Lianzhi [3769 5571 5347], et al. of the Changchun Institute of Applied Chemistry, Chinese Academy of Sciences]

[Text] Toughened epoxy resin with good properties was produced by adding isocyanate-terminated prepolymer obtained from hydroxy-terminated butadiene-acrylonitrile copolymer and toluene diisocyanate into epoxy resin. Its dynamic mechanical properties measured by torsional braid method indicate that there are two peaks in the plot of logarithmic decrement  $\Delta$  against temperature above 0°C. The transmission electron micrographs show that they have two phase structures and the phase reversal occurs while prepolymer content being 30 phr. This phenomenon was explained in terms of the curing of the resin. (Paper received 12 September 1985, finalized 10 January 1986.)

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CSO: 4009/1127

LIQUID TELECHELIC POLYMER, ITS MULTIPHASE COPOLYMERS--THE CROSSLINKING REACTION OF LIQUID VINYL-CARBOXYL TERMINATED TETRAHYDROFURAN-PROPYLENE OXIDE COPOLYMER WITH GLYCIDYL METHACRYLATE

Changchun YINGYONG HUAXUE [CHINESE JOURNAL OF APPLIED CHEMISTRY] in Chinese Vol 4, No 1, Feb 87 pp 35-39

[English abstract of article by Chen Zhongxiao [7115 6988 4562], Bian Xinsheng [0593 2450 5116], Zhang Junxiao [1728 0193 1321], Wei Xuerong [7614 1331 2837], and Zhang Qingyu [1728 1987 0151] of the Changchun Institute of Applied Chemistry, Chinese Academy of Sciences]

[Text] The crosslinking reaction of vinyl-carboxyl terminated tetrahydrofuran-propylene oxide copolymer with glycidyl methacrylate has been investigated. The effects of component ratio and catalyst on the mechanical properties of the product were observed. The changes of vinyl groups and epoxy groups were followed by IR spectrum measurement during the reaction process. The result indicates that the reaction of epoxy and carboxyl groups proceeds more difficultly than the addition reaction of vinyl groups. It is considered very important to choose an efficient catalyst to control the relative reaction rates and conversion degree of the two reactions.

The number of the effective crosslinking chains per unit volume ( $V_e$ ) and the average molecular weight between crosslinks ( $\bar{M}_c$ ) were determined by means of equilibrium swelling technique. The mechanical properties were improved with increase of crosslinking density.  $V_e$ ,  $\bar{M}_c$  and mechanical properties were influenced by the content of the catalyst used. (Paper received 6 November 1985, finalized 14 March 1986.)

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CSO: 4009/1127

## ON A.C. ETCHING OF ALUMINUM FOIL IN HYDROCHLORIC ACID

Changchun YINGYONG HUAXUE [CHINESE JOURNAL OF APPLIED CHEMISTRY] in Chinese  
Vol 4, No 1, Feb 87 pp 57-61

[English abstract of article by Yan Kangping [7051 1660 1627] of the Department of Chemical Engineering, Chengdu University of Science and Technology, Chengdu and Shen Xingsu [3088 5887 4790] of the Changchun Institute of Applied Chemistry, Chinese Academy of Sciences]

[Text] The effect of frequency from 10 to 100Hz on A.C. etching of aluminum foil in hydrochloric acid has been investigated. It was found that there exists an optimum frequency  $f_m$  corresponding to the relatively highest surface area magnification under certain etch condition.  $f_m$  was also temperature dependent, it moves toward higher value with increase of temperature. The preferable frequency and temperature were 20Hz and 35°C respectively. Based on the breakdown potential obtained from the oscillogram, the weight and the morphology of etch film, it may be concluded that with the frequency below  $f_m$  the etch film formed was thin and it was easy to be broken through to produce a higher density of pits, which would be merged with each other ultimately, leading to a loose morphology; with the frequency higher than  $f_m$  the etch film was too thick to be broken through, the etch morphology exhibited only a few large pits. Only at  $f_m$  the thickness of the etch film was suitable to produce a moderate density of pits, and at last a deep layer of roughened metal was formed, giving the maximum surface area magnification. The importance of the initial aluminum surface condition in A.C. etching was also discussed. (Paper received 14 February 1986, finalized 31 March 1986.)

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MEASURES TO PREVENT RADIOACTIVE POLLUTION STIFFENED

HK030624 Beijing CHINA DAILY in English 3 Jul 87 p 1

[Article by staff reporter Dong Lisheng]

[Text] China has acted to restrict radioisotope wastes from polluting the environment, a State Environmental Protection Bureau official told CHINA DAILY yesterday.

About 2,000 work units nationwide use artificial radioisotopes. They were first applied to industry, agriculture, medicine, and scientific research in the 1950s, said Luo Guozhen, head of the bureau's radioactive [materials] department.

Radioisotopes produce radioactive pollutants and waste, which amount to 200 to 300 cubic producing the wastes are mainly in urban cities.

He said no administration was in charge of controlling these waste for many years. Units using radioisotopes did not have sound regulations. As a result, accidents happened that polluted the environment and caused injury and death. Luo declined to provide details of these accidents.

Since the early 1980s, the bureau, now in charge of controlling the wastes, has done a lot to solve problems, he said.

In 1983, the bureau conducted a survey in 12 provinces and municipalities on radioactive pollution and control. It then issued a regulation to have warehouses built to store the waste.

Last year, 23 provinces, municipalities and autonomous regions began to build warehouses. Four are finished and this year another six will be put into use.

"The State planning administrations supported these projects and allocated money, although State finances have been under pressure in recent years," Luo said.

The warehouses are either underground, partly underground or above ground. They can each store 100 cubic metres of waste and be used for 20 to 30 years. One warehouse for each city is enough to control the situation, Luo said.

"The bureau will ensure safety regulations are strictly observed at the warehouses," he said.

RELATIONSHIP BETWEEN CLONIDINE ANALGESIA AND CALCIUM CATION

Beijing YAOXUE XUEBAO [ACTA PHARMACEUTICA SINICA] in Chinese Vol 22 No 3,  
Mar 87 pp 170-173

[English abstract of article by Geng Wanping [5105 4111 1627], et al., of the  
Department of Pharmacology, Anhui Medical University, Hefei]

[Text] Using the radiant heat tail flick method and radioactive ligand binding test, the relationship between clonidine analgesia and the central calcium cation was studied in rats. The analgesia of clonidine (1 mg/kg, sc) was antagonized by  $\text{CaCl}_2$  (1  $\mu\text{mol/rat}$ , icv) and potentiated by EGTA (0.2  $\mu\text{mol/rat}$ , icv), a calcium chelator. Although the pretreatment with verapamil (0.1  $\mu\text{mol/rat}$ , icv) showed no significant influence on the analgesia of clonidine (1 mg/kg, sc), it partly reversed the antagonistic effect of calcium. Calcium exhibited no inhibiting effect on [ $^3\text{H}$ ]-clonidine binding at the concentrations  $1 \times 10^{-7} \sim 1 \times 10^{-3}$  mol/L. The results suggest that the analgesia of clonidine is closely related to the calcium level of the tissue around the ventricles of the brain. The authors consider the clonidine analgesia to be involved in central calcium. They also postulate that calcium takes part in a physiological-biochemical process which is shared by the activated receptors in the endogenous analgesia system.

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CSO: 4009/3026

STUDIES OF SYNTHESIS OF 11 $\alpha$ -HYDROXY-QUINESTROL, 11 $\alpha$ -METHOXY-QUINESTROL AND THEIR ANTIFERTILITY ACTIVITY

Beijing YAOXUE XUEBAO [ACTA PHARMACEUTICA SINICA] in Chinese Vol 22 No 3, Mar 87 pp 191-195

[English abstract of article by Yang Yuwo [2799 3768 2053], et al., of the Department of Pharmaceutical Chemistry, Beijing Medical University]

[Text] Quinestrol was used as the lead compound for studies of new steroidal contraceptives for early pregnancy. The 11 $\alpha$ -hydroxyl and 11 $\alpha$ -methoxyl derivatives of quinestrol were synthesized.  $\Delta^9(11)$ -Estrone was treated with cyclopentyl bromide and potassium carbonate to form cyclopentyl ether (2). Hydroboration-oxidation of the ethylene ketal of (2) with B<sub>2</sub>H<sub>6</sub>-H<sub>2</sub>O<sub>2</sub> and chromatographic separation on silica gel gave 11 $\alpha$ -hydroxide (4) and a small amount of 11 $\beta$ -hydroxide and compound (3). (4) was methylated with NaH/DMSO and methyl iodide to produce (5). The 11 $\alpha$ -methoxy-quinestrol (7) was obtained when (5) was hydrolyzed with 5 percent hydrochloric acid and then ethynylated with ethynyl lithium. In addition, 11 $\alpha$ -hydroxy-quinestrol (9) was obtained when (4) was treated with 10 percent hydrochloric acid and then ethynylated with ethynyl lithium. The configurations of the target compounds and their respective intermediates were confirmed by IR, MS, <sup>1</sup>HNMR and elemental analysis. Preliminary pharmacological results on mice showed that 11 $\alpha$ -hydroxy and 11 $\alpha$ -methoxy derivatives of quinestrol did not possess significant antifertility activity.

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CSO: 4009/3026

EFFECTS OF VENOM OF BUTHUS MARTENSII KARSCH AND ANTIEPILEPSY PEPTIDE (AEP)  
ON HEART AND BLOOD VESSELS

Shenyang SHENYANG YAOXUEYUAN XUEBAO [JOURNAL OF SHENYANG COLLEGE OF PHARMACY]  
in Chinese Vol 4 No 2, May 87 pp 109-112

[English abstract of article by Liu Chong Ming [0491 1504 6900], et al., of  
the Department of Physiology; Zhou Xinhua [0719 5647 5478] of the Department  
of Biochemistry]

[Text] Reported in this paper are the effects of the venom collected from  
scorpions on Buthus martensii Karsch from Hebei Province, and AEP, isolated  
from the venom, on the heart and blood vessels.

In the authors' experiments. the LVP and LV dp/dt of anesthetized rabbits  
were increased by the venom, while the heart rate of the rabbits decreased  
slightly. The increase of the LVP and LV dp/dt caused by the venom could be  
counteracted by propranolol. The effects of AEP on LVP, LV dp/dt and heart  
rate were insignificant. The venom increased the contracting tension of the  
guinea pig's heart, decreased the heart rate and induced arrhythmia. The  
propranololin counteracted the contracting tension of the heart, but could  
not get rid of arrhythmia.

Compared with that caused by the same dosage of NE, the contraction of the  
rabbit's aortic strips by venom was one-fifth in strength. Based on the  
venom's action, tolazoline made the contraction curve turn upward while  
propranolol did the opposite.

Photoelectric plethysmograph tests showed that contractions of the blood  
vessels in the tails of anesthetized mice were affected by venom and AEP  
as well.

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CSO: 4009/3028

STUDIES OF L-ISOLEUCINE FERMENTATION. I. SCREENING FOR L-ISOLEUCINE PRODUCER

Shenyang SHENYANG YAOXUEYUAN XUEBAO [JOURNAL OF SHENYANG COLLEGE OF PHARMACY]  
in Chinese Vol 4 No 2, May 87 pp 117-121

[English abstract of article by Liu Dangsheng [0491 8094 3932], et al., of the  
Department of Microbiology]

[Text] A mutant AS110 was stepwisely derived from Brevibacterium flavum  
T<sub>6-13</sub> by treating it with NTG (N-methyl-N'-nitro-N-nitrosoguanidine) and  
UV (ultraviolet rays). It was a triple-resistant mutant to AHV ( $\alpha$ -amino- $\beta$ -  
hydroxy valeric acid), AEC (S-(-2-amino-ethyl)-cysteine) and Eth (ethionine).  
The growth inhibitions due to the related terminal amino acids were reduced.  
The mutant produced 7.0 mg/ml of L-isoleucine.

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PRODUCTION OF MONOCLONAL ANTIBODIES TO THERMOSTABLE DIRECT HEMOLYSIN OF  
VIBRIO PARAHAEMOLYTICUS AND ITS NEUTRALIZING EFFECT IN VITRO AND IN VIVO

Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICRO-  
BIOLOGY AND IMMUNOLOGY] in Chinese Vol 6 No 6, Nov 86 pp 369-371

[English abstract of article by Zheng Wenyan [6774 2429 3601], et al., of  
the Department of Microbiology, Shanghai Second Medical University]

[Text] Vibrio parahaemolyticus is an important bacterium of food poisoning.  
This organism produces thermolabile and thermostable direct hemolysins, and  
the latter is closely correlated with human pathogenicity. In this study  
the authors prepared monoclonal antibodies for the thermostable direct  
hemolysin. Their anti-direct hemolysin activity in mice ascites were found  
to be  $2-4 \times 10^{-6}$  by ELISA. All monoclonal antibodies can inhibit the  
hemolytic activity of thermostable direct hemolysin in vitro, and one named  
V56-12 protects mice against the thermostable direct hemolysin both in vitro  
and in vivo.

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CSO: 4009/3024

PREPARATION AND APPLICATION OF ANTI-HRPMcAb AND MOUSE PAP

Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICRO-BIOLOGY AND IMMUNOLOGY] in Chinese Vol 17 No 2, Apr 87 pp 81-83, 103

[English abstract of article by Cheng Ming [4453 2494], et al., of the National Vaccine and Serum Institute, Beijing]

[Text] This study reports the characteristics of six anti-HRP McAb and suitable conditions for preparing mouse PAP using anti-HRP McAb and HRP. The mouse PAP has been used for ELISA and immunohistochemical techniques.

The ELISA results have proved to be more sensitive than those of indirect enzyme-immunoassay by 4-32 times. The determination of immunohistochemical techniques not only revealed significant staining at the site of the positive antigen, but also produced very light background staining.

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CSO: 4009/3022

MODULATION OF INTERFERONS AND DRUGS ON NATURAL KILLER ACTIVITY

Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 17 No 2, Apr 87 pp 95-98

[English abstract of article by Sun Weimin [1327 5898 3046], et al., of the Department of Microbiology, Second Military Medical University, Shanghai]

[Text] The modulatory effects of IFN- $\gamma$  and drugs separately or in combination were studied in vitro on the natural killer activity of human peripheral blood lymphocytes against K<sub>562</sub> cells. The results show that IFN- $\gamma$  is 10 times more active than Namalva IFN, and there is an additive effect when combined in use. The authors found that the hematoporphyrin photosensitizer PSD-007 increased the NK activity, but could not induce IFN. It was also found that the increasing effects of PSD-007 and IFN- $\gamma$  were additive and that the enhancing effect of esculentoside on NK activity might be related to the IFN- $\gamma$  induced by this drug. In addition, carboxymethyl starch (405) induced some IFN but markedly inhibited NK activity, while IFN- $\gamma$  could partially reverse the inhibition. Tiao-wei II (scopolamin) had little effect on enhancing NK activity, while prednisone acetate and dexamethasone acetate inhibited NK activity, which could be reversed by IFN- $\gamma$ . The mechanisms of drugs on NK activity are discussed.

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CSO: 4009/3022



INVOLVEMENT OF DYNORPHIN IN ANTINOCICEPTION INDUCED BY INTRATHECAL INJECTION  
OF NEUROTENSIN IN RATS

Shanghai SHENGLI XUEBAO [ACTA PHYSIOLOGICA SINICA] in Chinese Vol 39 No 1,  
Feb 87 pp 19-25

[English abstract of article by Han Songping [7281 2646 1627] of the Department  
of Neurotransmitters, Beijing Institute of Neurosurgery; Xie Guoxi [6200 0948  
3886] of the Department of Physiology, Beijing Medical College]

[Text] Intrathecal injection of neurotensin (0.63-5  $\mu$ g) produced a dose-  
dependent analgesic effect in rats. This analgesic effect was antagonized  
by intrathecal injection of the opioid antagonist naloxone (100  $\mu$ g) or anti-  
dynorphin IgG (20  $\mu$ g), but not by anti-enkephalin IgG or enkephalin degrading  
enzyme inhibitors bestatin, thiorphan and captopril. These results suggest  
that the antinociceptive effects induced by intrathecally administered neuro-  
tensin are mediated, at least in part, by dynorphin in the spinal cord of the  
rat.

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MOBILIZATION OF GRANULOCYTE-MACROPHAGE COLONY-FORMING CELL (CFU-GM) INTO  
PERIPHERAL BLOOD OF MOUSE BY CH. VIOLACEUM ENDOTOXIN

Shanghai SHENGLI XUEBAO [ACTA PHYSIOLOGICA SINICA] in Chinese Vol 39 No 1,  
Feb 87 pp 61-67

[English abstract of article by Zhang Jin [1728 6651], et al., of the Department  
of Radiation Medicine, Second Military Medical College, Shanghai]

[Text] Mobilization of CFU-GM from hematopoietic tissue into circulation of mice was studied after intravenous injection of Ch. violaceum endotoxin. A single injection 25  $\mu$ g dose of endotoxin appeared to produce about a two-fold increase in CFU-GM per  $10^5$  MNC. That evaluation of CFU-GM/ $10^5$ MNC after endotoxin coincided with a decrease in the counts of CFU-GM in the femur. The effect was greater as higher doses of endotoxin were injected. The spleen seems to be acting as an organ capturing CFU-GM from the blood and not as a source adding progenitor cells to the blood. Adrenalectomized mice did not show the increase of CFU-GM in the peripheral blood following endotoxin administration. This indicates that the mobilization of CFU-GM might be mediated by adrenal or cortical hormones.

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ISOLATION PURIFICATION AND CHARACTERIZATION OF ALKALINE PHOSPHATASE FROM  
VENOM OF OPHIOPHAGUS HANNAH (CANTOR) IN GUANGXI, CHINA

Shanghai SHENGWUHUAXUE YU SHENGXUSULI XUEBAO [ACTA BIOCHIMICA ET BIOPHYSICA  
SINICA] in Chinese Vol 18 No 4, Jul 86 pp 320-326

[English abstract of article by Qin Jiaren [6009 3946 0088], et al., of the  
Department of Biochemistry, Guangxi Medical College]

[Text] Alkaline phosphatase (E.C.3.13.1.AKP) has been isolated and purified from the snake venom of Ophiophagus hannah (Cantor) by gel filtration on sephadex G-150, CM-Cellulose column chromatography, ultrafiltration and concentration. The pure product was studied with respect to its enzymatic activity, PI values, optimum pH, optimum temperature, inhibitors, activators,  $K_m$  value isozymes and polyacrylamide gel electrophoresis pattern. The molecular weight of ADP is  $91,900 \pm 3,900$  (by gel filtration) or  $95,100 \pm 3,700$  (by PAGE). The number of amino acid residues in the AKP molecule is about 845.

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PURIFICATION AND IDENTIFICATION OF Ig CLASS OF McAbs AGAINST MOUSE  
T LYMPHOCYTE ANTIGEN

Shanghai YI DAXUE XUEBAO [ACTA ACADEMIAE MEDICINAE SHANGHAI] in Chinese  
Vol 13 No 5, Sep 86 pp 326-329

[English abstract of article by Lin Yunlu [2651 0061 3873], et al., of the  
Laboratory of Immunology, Department of Pathophysiology, Faculty of Basic  
Medical Sciences, Shanghai Medical University]

[Text] Ascitic fluid was induced in BALB/C mice by intraperitoneal injection  
of C 10 subclone hybrid cells selected from the fusion of mouse myeloma cells  
and rat spleen cells.

McAb obtained from purified ascitic fluid by affinity chromatography on  
sepharose 4B showed high cytotoxic effects against mouse T lymphocyte  
antigens. Double immunodiffusion and immunoelectrophoretic tests proved  
the fraction with the highly cytotoxic effect to be the IgG class in rats.  
Its molecular weight of 165000 was estimated by comparing its mobility to  
known standards run on the same SDS-polyacrylamide gel.

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CLINICAL OBSERVATIONS OF LEVONORGESTREL-RELEASING SUBDERMAL CAPSULES,  
NORPLANT CONTRACEPTION

Shanghai YIKE DAXUE XUEBAO [ACTA ACADEMIAE MEDICINAE SHANGHAI] in Chinese  
Vol 13 No 3, May 86 pp 213-217

[English abstract of article by Du Mingkun [2629 2494 2492], et al., of the  
Gynecological and Obstetrical Hospital, Shanghai Medical University]

[Text] Since October 1984, Norplant and Norplant-2 from the Population  
Council have been used for contraception in the Gynecological and Obstetrical  
Hospital, Shanghai Medical University.

Six months' use by 300 women (250 women using Norplant, 216 mg in 6 capsules,  
and 50 women using Norplant-2, 140 mg in 2 covered rods) are summarized. In  
both, continuation rates were 97.99 percent; pregnancy rates were 0.40 percent  
and 0 percent; and termination rates 1.60 percent and 2.00 percent, respectively,  
at the end of the 6 months.

The most important side effects during use of this system included changes in  
bleeding patterns. This was also the most frequent reason for termination.  
This method eliminates user failure and unnoticed expulsion and pregnancy  
rates are low. Continuation rates in this study show that the acceptability  
of this method in Chinese women is good.

Norplant contraceptive implants require minor surgery for insertion and  
termination, but with good training mastery of this skill is not difficult.  
In the 656 cases already implanted, no infection or complications have  
occurred, and no other serious side effects among users have been found.

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CSO: 4009/3020

NATION'S TECHNOLOGICAL TRANSFORMATION REVIEWED

Hong Kong LIAOWANG OVERSEAS EDITION in Chinese No 17, 27 Apr 87 pp 6-7

[Article by Ge Xiangxian [5514 6272 6343]: "China's Technological Transformation Work—Interview With a Responsible Person of the State Economic Commission Technological Transformation Bureau"]

[Text] Recently this reporter paid a visit to a responsible person of the State Economic Commission Technological Transformation Bureau to find out about the progress in China's technological transformation.

Remarkable Achievements in Technological Transformation

The responsible person first talked about what technological transformation has achieved in China during the Sixth 5-Year Plan (1981-1985) and 1986. During the Sixth 5-Year Plan, China invested 147.7 billion yuan in technological transformation, a 75 percent increase over the 84 billion yuan actually invested during the Fifth 5-Year Plan, and the average annual increase during this period was 18.2 percent, higher than the 12.8-percent average annual increase in investment in capital construction during the same period. The proportion of investment in technological transformation in the total amount invested in fixed assets increased from 26.4 percent in the Fifth 5-Year Plan to 28.7 percent in the Sixth 5-Year Plan.

During the Sixth 5-Year Plan, 200,000 technological transformation projects were completed and put into production, and the 111 billion yuan worth of new fixed assets added was equivalent to one-fifth the total value of fixed assets of all state enterprises at the end of 1980. Of the increase in GVIO in the Sixth 5-Year Plan, about two-thirds was the result of technological transformation and consolidation of enterprises. According to the State Statistical Bureau's data analysis, of the increases in output value resulting from investment in fixed assets in the Sixth 5-Year Plan, technological transformation accounted for more than 90 percent of the increase in steelmaking, caustic soda, machine tools, cigarettes, television sets, and refrigerators; more than 80 percent of the increase in sulfuric acid, soda ash, cotton spindles, wrist watches, bicycles, and leather shoes; more than 60 percent of the increase in iron-smelting, automobiles, cement, and sewing machines; and more than 40 percent of

the increase in steel blooms, aluminum fabrication, chemical fertilizers, glass, and so forth.

During the Sixth 5-Year Plan, China imported more than 10,000 items of technology and key equipment, worth \$10 billion in foreign exchange. One-third of these items have been completed and put into production. Most of the items are of the international standards of the late 1970's and early 1980's. Some have been assimilated and applied. As a result, the technological standards of some industries and products have shown marked improvement, greatly narrowing the gap with the developed countries.

According to statistics, 60 billion yuan was invested in technological transformation in 1986, up 34 percent from 1985. The investment pattern shows that the proportion of investment funds has increased for reducing consumption, improving product quality, and increasing variety, and decreased for merely increasing production capacity; that the proportion of investment funds has increased for the raw and semifinished materials industries; that investment for the updating and renovation of the metallurgical, chemical, building materials, nonferrous metals, and petrochemical industries has increased 41.2 percent, and for the light and textile industries, 36 percent; and that work has begun on the technological transformation of 585 key enterprises, the first group to undergo technological transformation with state support during the Seventh 5-Year Plan, and many renovation projects are under way. In short, technological transformation is making good progress.

The responsible person of the Technological Transformation Bureau made an analysis of the tremendous impact of technological transformation on national economic development in the past few years. 1. It has accelerated the readjustment of the economic structure, increased the relative importance of the light, textile, and food-processing industries, and brought about a better balance among agriculture, heavy industry, and light industry. 2. It has brought about an increase in varieties of goods, thus better meeting the people's demands, adding prosperity to the domestic market, and enhancing China's ability to compete in the international market. 3. It has improved product quality. For example, the percentage of machinery and electrical products which are up to the international standards of the late 1970's has increased from about 10 percent to about 30 percent, and some large, precision equipment and high-grade consumer goods which could not be produced can now be mass produced. 4. It has updated and renovated some technologies and equipment, resulting in markedly reduced consumption of energy and raw and semifinished materials. More than 20 million tons of standard coal were saved as a direct result of improvement in technology and equipment during the Sixth 5-Year Plan. 5. In order to step up technological transformation and raise the technological level of existing enterprises, not only have China's own technological achievements been widely applied, but suitable advanced technologies have also been brought in from abroad, thus narrowing the technological gap between us and the developed countries.

The responsible person said: Progress of technological transformation in China is also manifest in the following:



1. The focus of attention is gradually shifting from building new plants to renovating old ones and from extensive to intensive methods. China has built an independent and fairly complete industrial system with more than 400,000 industrial and transport enterprises. State enterprises have 600 to 700 billion yuna worth of fixed assets. However, for a long time, the stress in economic development has been on setting up new enterprises and starting new projects to the neglect of the technological transformation of existing enterprises; enterprises are under pressure to increase production and output value at the expense of quality and variety; with a very low depreciation rate for their fixed assets, and allowed to keep only a small share of their profits, the enterprises have very little money to carry out technological transformation on their own; and fettered by the old management system, the enterprises have no urge or motivation to seek technological improvement. Some large key enterprises were built in the First 5-Year Plan, and they are characterized by their obsolete equipment and technology, out-of-date products, low quality, high consumption, and poor economic performance. Since the 3d Plenum of the 11th CPC Central Committee, the party has made the technological transformation of existing enterprises in a planned and systematic way a major strategic policy and clearly directed that future expansion of reproduction should be achieved mainly through technological transformation of existing enterprises and bringing their role into full play. In accordance with the State Council's decisions, the State Economic Commission called four national conferences on technological transformation of enterprises between 1983 and 1986 to formulate technological improvement plans, policies, and measures. The various departments and local authorities have also done a lot of work. All this has given a powerful impetus to the technological transformation of enterprises.

2. Enterprises were ordered to make renovations in the past, but they now make their own decisions on whether and what renovations are needed. Before the structural economic reform, renovations of state-owned industrial enterprises were always made according to orders from departments in charge of them. With the intensification of the economic reform, the enterprises have been given greater decisionmaking power. To meet market demands at home and abroad and adapt to the development of the commodity economy, the enterprises have the need and incentive to increase varieties, improve quality, and expand production capacity through technological transformation.

3. Enterprises which could not make renovations in the past are now more and more capable of doing so. In the past, the enterprises' depreciation funds for fixed assets were all turned over to the state. The funds have now been returned to the enterprises. The enterprises can obtain about one-third to one-half of the funds they need for technological transformation from bank loans and have to raise the rest on their own.

4. The departments in charge used to directly control the technological transformation projects. Now their role is gradually shifting to policy-making, planning, coordination, and the use of economic levers,

information, consultation, and legal means to promote technological transformation.

5. Once technological transformation was the job of the technological personnel of each enterprise, department, or area. Now an enterprise can carry out its technological transformation by setting up lateral ties with research and designing institutes, universities, colleges, and defense industries.

6. Products are gradually changing from meeting domestic demands to export-oriented. To expand exports and earn more foreign exchange, enterprises are encouraged to bring in advanced technologies from abroad and hire foreign experts.

#### Orientation and Tasks of Technological Transformation in the Seventh 5-Year Plan

The responsible person told this reporter that total investment in technological transformation and equipment renewal for state enterprises in the Seventh 5-Year Plan will be 276 billion yuan, an 87-percent increase over the amount invested in the Sixth 5-Year Plan. Of the total investment in fixed assets for state enterprises, funds spent for equipment renewal and technological transformation will increase from 28.7 percent in the Sixth 5-Year Plan to 30.8 percent.

The orientation and tasks of technological transformation in the Seventh 5-Year Plan are:

1. The central task is to improve economic performance. The goals of technological transformation in the Seventh 5-Year Plan are: to enhance product quality, economize on energy, reduce consumption of raw and semi-finished materials, develop new products, expand manufacture of high-quality brands and of products that are in short supply, improve occupational safety and welfare, and control environmental pollution. Technological transformation will be carried out mainly in enterprises which are leaders in production technology and managerial skills and which can serve as models after the transformation. Priority should be given to Shanghai and the old industrial cities and bases in Liaoning, where technological transformation should make broader progress. The machine-building and electronics industries should continue to be the first to update their technology.

2. Further efforts should be made to invigorate the large and medium-sized enterprises and increase their ability to accumulate funds and carry out their own technological transformation. The state will continue to give preferential treatment to the petrochemical, chemical, nonferrous metals, railway, civil aviation, posts and telecommunications, coal, and hydroelectric power industries and departments regarding investment and output so that they can retain enough funds from their profits to be used for technological transformation. Other large and medium-sized

enterprises receiving state support for technological transformation should also be given preferential treatment, such as exemption of regulatory taxes and higher depreciation rates.

3. Attention should be paid to the strategic task of earning foreign exchange through exports and producing substitutes for imports to bring about a benign economic cycle. Efforts should be made to change the mix of export commodities from roughly processed products to finely processed products and from primary products to manufactured goods. Attention should be paid to expanding exports of textile and light industrial products and to producing more machinery and electrical products to earn foreign exchange through exports and to substitute imported items.

4. Technological imports should be changed in three ways; from importing mainly production lines and key equipment, to importing mainly computer software, advanced technology, and necessary key equipment; from importing mainly by enterprises, to importing jointly by research and production units; and from importing mainly for the purpose of production and use, to importing mainly for digestion and assimilation.

5. Enterprises in each area should be encouraged to develop lateral economic ties. Organization of enterprise groups or associations with manufacturers of high-quality products playing a leading role should be encouraged so that technological transformation can be carried out in a coordinated way based on reorganization and cooperation. Such groups or associations are also conducive to bringing the strong points of an area or a key city into full play. The defense industries are now concentrating on renovating nearly 100 of their production lines in order to produce economic results as soon as possible.

6. The investment system for fixed assets should be reformed. While invigorating enterprises and increasing their ability to carry out technological transformation on their own, it is also necessary to strengthen macroeconomic control and gradually develop an investment system with effective macroeconomic control, microeconomic flexibility, and self-restraint.

#### Current Technological Transformation Tasks

1. In accordance with the instruction by a leading member of the State Council that technological transformation of large and medium-sized enterprises should be planned by categories and that appropriate policies and measures should be formulated, plans should be made by categories for the more than 8,000 large and medium-sized enterprises in various areas. It is tentatively planned to revitalize some 5,500 old enterprises established in the 1950's and 1960's through technological transformation during the seventh and eighth 5-year plans. For the present, priority should be given to the transformation of 1,600 key large and medium-sized enterprises.

2. Continued attention should be paid to implementing the 1987 technological transformation special loan program, including discount loans.

3. In the campaign to increase production, practice economy, raise revenues, and reduce expenditures, the role of technological transformation should be brought into full play. Technological transformation projects and imported technologies should be put into production as soon as possible. Our limited funds should be used on projects and imports which can produce results this year.

4. Further studies should be made on how to achieve microeconomic flexibility and macroeconomic control of technological transformation. The major task of macroeconomic control is to formulate realistic investment and production policies to strike a balance between production and demand and to provide timely information on which industries should be developed and which should be restricted, on the basis of market demands and technological progress.

5. Theoretical research related to technological transformation should be stepped up and properly organized.

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AERONAUTICS MINISTRY ASSUMES GROWING ECONOMIC ROLE

Integrating Military, Civilian Production

Beijing KEJI RIBAO in Chinese 25 Mar 87 p 2

[Article by Zhang Yanzhong [1728 1750 0112], director of Science and Technology Bureau, Ministry of Aeronautics: "The Ministry of Aeronautics Should Become the Technology and Equipment Department for Economic Construction"]

[Text] After more than 30 years of development, China's aviation industry has grown into a rather wide-ranging and technologically fairly advanced production system employing more than 70,000 scientists, engineers, and technicians. Following the CPC Central Committee's policy of "integrating military and civilian production with emphasis on civilian production" to make the strategic change and speed up the transfer of defense technology to civilian production, the aviation industry should strive to become a supplier of technology and equipment for economic construction and a major earner of foreign exchange through exports during the Seventh 5-Year Plan.

First, it is necessary to follow the principle of integrating military and civilian production with emphasis on civilian production, diversification on the foundation of the aviation industry, stepping up research and insuring quality, and enhancing competitiveness as a group in the international market. While building up the foundation at home, efforts should be made to develop cooperation with foreign countries. While giving priority to main-line aircraft, feeder-line aircraft, helicopters, and airplanes for agricultural and forestry uses should also be developed in a coordinated way to gradually meet the requirements of domestic civil aviation and agricultural, forestry, and other specialized fields of work.

Second, vigorous efforts should be made to develop nonaviation products with distinctive features to serve the technological transformation of the national economy. For example: production of auxiliary equipment, wind-driven generators, and various types of vehicles for energy extraction; cooperation with the machinery industry to develop various types of precision machine tools and numerically controlled machine tools; development of complete sets of spinning and weaving machines for the textile industry; development of complete sets of equipment and modern automatic packing and vacuum machines for the

food-processing and packing industries; and production of complete sets of equipment for the light and building materials industries and medical, health, physical culture, and other departments.

Third, expanding exports should be regarded as a strategic task of the aviation industry. The advantages of the aviation industry in technology and equipment should be brought into full play in developing both the domestic and foreign markets. In addition to expanding exports of aviation products, efforts should also be made to expand contracting for manufacture of airplane parts and accessories for foreign countries and to increase exports of products derived from aeronautical technology and nonaviation products. Efforts should be made to win a share of the international market and earn more foreign exchange for the country.

Fourth, vigorous efforts should be made to produce substitutes for imports. The aviation industry should cooperate with relevant departments and areas to strengthen the assimilation, application, and development of imported technology, increase the proportion of goods produced at home, develop equipment and spare parts which can substitute imports, save foreign exchange for the country, and at the same time raise China's own standards.

In practice, the Ministry of Aeronautics will bring the aviation industry's manpower and technological advantages into full play, do a good job in further developing and commercializing technological achievements, and transfer defense technology to civilian production at different levels and through different channels. It will actually help the township enterprises and small and medium-sized enterprises solve technological problems and provide high-quality services for the economic development of poor areas in the form of technology transfers, technical services, technical consultations, and technical contracts. It will undertake key research projects for the state. It will develop some high-grade, precision, and advanced products which are not yet produced in China.

The ministry will continue to speed up and intensify the structural reform and strive to promote lateral associations between research and economic departments, particularly research-production partnerships between the ministry's research and design institutes and universities and colleges and enterprises, to insure the transfer of military technology to civilian use. Moreover, it will explore all effective ways to strengthen the foundation of the aviation industry, raise its standards, speed up the transfer of military technology to civilian use, and constantly raise it to a higher level.

#### Self-supporting Research Institute

Beijing KEJI RIBAO in Chinese 25 Mar 87 p 2

[Article by Li Jilan [2621 4949 5695]

[Text] In the course of its structural reform, the China Precision Aeronautical Machinery Research Institute has adopted the contract system and made serious efforts to develop advanced technologies for civilian use. In the past 6 years, 60 of its technological achievements have won ministry and higher awards.

The institute was managed as an enterprise. In August 1984, with the Ministry of Aeronautics' approval, it became an experimental unit for the reform of the research system. In the experiment, they implemented first of all four different forms of economic responsibility systems with research contracts as the core. Also adopted was a complete research project selection and appraisal procedure to insure success of every research project and application of its results. The institute also carried out appropriate reforms of its personnel and distribution system in the past year. The number of its functioning sections and offices was reduced by 12 percent from the number in 1984, and its second-line personnel were to receive cash awards on their different positions.

With economic self-sufficiency, the institute has broken through the confines of military research and development and sought to produce marketable civilian goods. Taking advantage of its defense technology and advanced equipment, it has set sights on high-tech civilian products. Since the key research projects for the Seventh 5-Year Plan were announced for public bidding by the state, the institute has won one contract after another among many strong bidders, undertaking the development of a gauge head system used in a flexible manufacturing technology and many other items. The institute's three-dimensional measuring machine, inertial flight control testing equipment, precision processing technology and other research results are among the most advanced in China. It has also developed measuring machines, precision parts and components, servo valves, and other key civilian products as well as some intermediate-and low-grade items.

#### Serving National Economy

Beijing KEJI RIBAO in Chinese 25 Mar 87 p 2

[Article by special reporter Juang Bin ]7806 2430]: "The Ministry of Aeronautics Serves the National Economy in Many Ways"]

[Text] The Ministry of Aeronautics is promoting the transfer of military technology to civilian production in many ways. In 1986, civilian products accounted for 60 percent of the ministry's total industrial output value. In addition to civilian aircraft, the ministry produced more than 2,500 kinds of civilian goods including minicars and other major civilian products, showing the great potential capacity of the aviation industry.

--Providing advanced products and equipment. The ministry has developed more than 10 types of aircraft for civilian use including the Yun-5, Yun-7, Yun-8, Yun-11, and Yun-12 transport planes and Zhi-9 helicopters. In the past year, 15 Yun-7 airplanes were made available for civil aviation. It also provided complete production lines, machineries, and spare parts for 21 different trades including petroleum, chemical, transport, metallurgical, textile, medical, food, environmental protection, and light industries. The equipment provided included automatic bread production lines, sewage purification systems, open-end spinning machines, extra large beer containers, laser holographic equipment, pumps, valves, hydraulic sealing elements, and so forth. One of the ministry's outstanding achievements in the past few years was the application of aircraft engine technology to the energy and transport industries.

According to statistics, the ministry has developed 4 series and 10 models of light-duty gas turbines, and 83 of these gas turbines have been in operation for a total of 250,000 hours in 13 provinces and regions. Applying the aeroturbine expansion refrigeration technology to the petrochemical industry, the ministry has produced 26 light hydrocarbon recovery units. The largest unit is installed in the Dagang oil field, which can treat 1.2 million cubic meters of oil field gas daily with an annual output value of 28 million yuan.

--Transferring technological achievements to civilian organizations and enterprises. Since 1985, the ministry has used the technology markets to transfer defense technologies to civilian use. It has attended four large-scale national technology trade fairs and made deals worth a total of nearly 1 billion yuan. Three products developed by the Beijing aeronautical materials research institute and other units (cold degreasing water-based cleaning agent, water-based transparent cutting fluid, and dewatering and rust-preventing oil) have been transferred to more than 20 enterprises in 13 provinces and cities, enabling them to save about 20,000 tons of gasoline each year. A forced-injection leak-stopping technology won a silver medal at the 13th world inventions exhibition. Since the technology was adopted by the Liaoyang Petrochemical Co, it has turned the company into a continuous and leak-free production enterprise, cutting losses by more than 10 million yuan each year. The technology has now been transferred to more than 10 enterprises in China, with an estimated annual saving of 100 million yuan.

--Using defense technology to transform civilian enterprises. The ministry's 606 Institutes has developed an automatic viscose screener jointly with the Dandong chemical fiber plant, and a viscose filament press jointly with the Hangzhou chemical fiber plant, new breakthroughs for the chemical fiber industry.

The ministry has also achieved outstanding results in using its superior aerial testing and computer equipment to promote the technological transformation of civilian industries. The 634 Institute and other units have cooperated with the Ministry of Coal Industry in the successful development of the KJ-4 coal mine safety monitoring system, which is of advanced international standards of the 1980's.

--Vigorously developing technological consultations and services. In transferring defense technology to civilian use, the ministry has provided both "software and hardware" and many forms of technological services and consultations. The Beijing Aeronautical Engineering College has formulated the city's liquefied gas cylinder testing and discarding standards, which are used to test 900,000 steel cylinders and can save 30 million yuan a year.

#### Producing Quality Civilian Goods

Beijing KEJI RIBAO in Chinese 25 Mar 87 p 2

[Article by Zhang Yuying [1728 3768 3853]: "The Ministry of Aeronautics Qinfeng Plant Produces More and More High-grade Civilian Goods"]



[Text] Making use of its superior aerohydraulic technology, the Ministry of Aeronautics Qinfeng precision hydraulic equipment plant has developed jointly with research institutes 6 series and more than 200 kinds of high-grade, precision, and advanced civilian products in just 3 years. The products are doing very well competing against similar foreign products. In 1986, civilian products accounted for 95 percent of the plant's total output value, and the plant showed a profit of 1.2 million yuan. The plant has become the first plant to produce series of hydraulic equipment and the largest electro-hydraulic servo valve producer in China. It serves as an example for the defense enterprises to develop quality civilian products.

In 1980, the plant's military production tasks dropped sharply from more than 8 million yuan down to a few hundred thousand yuan a year. In its hasty effort to find additional work, the well-equipped, technology-intensive enterprise did what it was not meant to do--production of low-grade hardware items. In 3 years, the plant lost 3 million yuan and was forced to close down. In the face of the set-back, they did some serious thinking and arrived at the conclusion that the plant should take full advantage of its superior equipment and technology, apply the aeronautical electro-hydraulic servo control technology to civilian production, increase automation, and develop high-grade, precision, and advanced products. In 3 years, using mainly the hydraulic technology, the plant developed jointly with some research units six series of major products including electro-hydraulic servo valves, hydraulic fittings for electric equipment, hydraulic machines and tools, hydraulic cylinders for the "Xiaosong" bulldozers, fitting for chemical fiber spinning and weaving machines, and a new type of adjustable speed reduction gears. The results began to show in 1985 with the plant's total output value rising to 4.6 times that in 1981. The plant's total output value in 1986 again increased by 40 percent over 1985.

Qinfeng's series of hydraulic products are up to the same standards as foreign products with some unique features of their own, but their prices are only 1/5 to 1/10 of the prices of imports. Thus they enjoy a huge price advantage in competing with foreign products, and reduced the need to import them. Qinfeng's products are now being used in more than 20 fields including the space, aviation, metallurgical, mining, automotive, power, and construction industries. In the first "man-made ocean" completed in China in October 1986, a complete set of electro-hydraulic servo wave-making equipment, the first of its kind in China, was provided by the Qinfeng plant. At the Guangzhou Export Products Fair, the new adjustable speed reduction gears, developed by the Beijing Aeronautical Engineering College and produced by the Qinfeng plant, which had won an award at the 13th international inventions exhibitions in Geneva in 1985, were well received by Chinese and foreign business people. Recently Qinfeng's products began to find their way into the international market.

#### Growing Exports

Beijing KEJI RIBAO in Chinese 25 Mar 87 p 2

[Article by Song Chaolin [1345 2600 2651]: "Rapidly Growing Exports of Aircraft Parts and Civilian Goods"]

[Text] At present, the Ministry of Aeronautics is exporting civil aircraft parts to 8 countries including Britain, the United States, and France and 10 categories of nonaviation products to more than 10 countries. The number of enterprises engaged in exports of machinery and electrical products and enterprises with expanded decisionmaking power in foreign trade under the ministry's jurisdiction has increased to 21.

In the past few years, the ministry has continuously expanded exports of civilian products by way of international cooperation, technological exchanges, and production contracts. It has now established trade relations and S&T cooperation with 55 countries and areas, and products exported have increased from small quantities of nonaviation products at first to include civilian aircraft, aircraft parts, and 10 categories of nonaviation products. In 1986, six Yun-12 aircraft were exported, the first civilian aircraft exported by China. Civilian aircraft and parts and accessories were designated by the state last year as one of 20 categories of major export machinery and electrical products. Ten categories of nonaviation products including household electrical appliances, building electrical appliances, precision machineries, forgings and castings, measuring implements, cutting tools, combined clamps, and granite plates were exported to European and Asian countries.

The aviation industry's advanced equipment and technology insure the quality of its export civilian products. Some European firms have come to China to place orders for goods. Other have signed long-term contracts with Chinese producers. Among the products, the combined clamps for navigation marks won Britain's 1986 machine tool industry award for the best tools. American experts think that cutting tools made in China have a 40-percent higher stock removal rate than U.S. and Japanese products, and a service life three times as long.

The Ministry of Aeronautics has made developing exports of civilian machinery and electrical products and aircraft an important foreign-exchange earning task during the Seventh 5-Year Plan. It is planned that by 1990, the number of enterprises engaged in exporting machinery and electrical products and enterprises with expanded decisionmaking power in foreign trade will be increased to 30, and efforts will be made to increase total exports to \$550 million.

#### Lateral Associations

Beijing KEJI RIBAO in Chinese 25 Mar 87 p 2

[Article by Yang Zhenchao [2799 2182 6389]]

[Text] The Beijing Aeronautical Engineering College recently sent a group of experts and professors headed by its vice president and a flying performance team on a technological observation tour to Nanning, Liuzhou, and Guilin, Guangxi. In just 10 days, they held talks with 29 small and medium-sized enterprises on 55 project and signed 19 agreements and letters of intention.

The Beijing Aeronautical Engineering College offers a number of engineering courses. It has a strong technological faculty of more than 2,000 specialized scientists and technicians including 700 professor and associate professors. Many of its technological achievements can be applied to small and medium-sized enterprises with a little adaptation. For example, the die-making, precision-casting, alloy stamping and coloring, air-cooling, and other technologies, discussed during the group's trip to Guangxi, are all well-developed technologies by the college and much to the liking of the small and medium-sized enterprises. Departments concerned in Guangxi are also interested in the ultralight airplanes developed by the college, which can be used for agricultural and grassland aerial seeding, and orders have been placed. The college has held further talks and signed contracts with a number of firms in Guangxi.

### Technological Transformation

Beijing KEJI RIBAO in Chinese 25 Mar 87 p 2

[Article by Zhong Qiang [6945 1730]: "Nanfang Company Becomes an Enterprise With a Multileveled Product Mix"]

[Text] In producing civilian products in the past few years, the Ministry of Aeronautics' Nanfang Power Equipment Co has paid serious attention to technological transformation and the development of new products. A multileveled product mix has been formed. The company is now a technologically fairly advanced enterprise producing a rather large number of products, both military and civilian.

The Nanfang Co was an airplane engine factory established in the early 1950's. For many years, nothing has changed at the factory. The plant building was small and cramped, equipment and technology obsolete, and products out-of-date. Since 1980, military orders has dwindled, and things became harder and harder for the company.

In the past 2 or 3 years, in the process of developing civilian products, the company has made serious efforts to transform itself technologically and set up step by step specialized manufacturing systems, production lines, and so forth. In actual practice, they set the proper priorities, make reasonable arrangements, and emphasize efficiency. For example, in renovating the production lines for motorcycles, a major civilian product, they give priority to the key items and plan to complete three major renovation projects in 3 years, concentrating on one project each year. By 1988, highly efficient production lines will be completed to produce 100,000 motorcycle engines and 20,000 motorcycles annually.

In developing new products, priority is given to major products, while small and medium-sized products are developed at the same time, thus forming a ladder-shaped product mix. Turning the Wojiang-6 airplane engine into a ground power source, they have been used at the Zhongyuan, Changqing, and four other oilfields and the Lhasa thermal power station with good results. In addition to such major products as motorcycles, engines, and so forth, the company last year developed four medium-sized products including a pressure container, a fiber equipment part, etc. The company has also called on the plants and workshops under its jurisdiction to develop certain small civilian products. The company has entered the most active development period in its history.

NATIONAL DEVELOPMENTS

BEIJING MAYOR NOTES PROGRESS IN MICROELECTRONICS

OWO10822 Beijing XINHUA in English 0738 GMT 1 Jun 87

[Text] Beijing, 1 June (XINHUA)--Beijing has made 24 million yuan using micro-electronics in the renovation of old equipment, which has saved 1 million kilowatt hours of electricity and 5,000 tons of coal since early last year.

"Micro-electronics must be popularized in the capital when renovating old equipment," said Mayor Chen Xitong at an award ceremony recently to honor individuals and collectives who have made outstanding progress in the field.

Some 80 percent of the city's 45,000 machine tools were made in the 1950s or 60s, according to statistics. Micro-electronics renovation has proved efficient in upgrading old equipment.

In Beijing Heavy Machine Plant now controls a 20-ton furnace with a micro-computer which has increased the thermal efficiency by 8 percent and saved 1,000 tons of coal last year. The plant recovered the cost of the renovation in 18 months.

Since early last year, the city has renovated 552 machine tools with digital display technology, 38 percent more than the total number renovated during the 1981-85 period.

The city has offered financial aid and preferential loans to enterprises that renovate equipment using micro-electronics.

Mayor Chen also called on departments concerned to give more preferential treatment and awards to micro-electronics users and to punish those refusing to popularize new technology.

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CSO: 4010/1039

CHINA DEVELOPS, MARKETS NEW MICROCOMPUTERS

HK130913 Hong Kong ZHONGGUO XINWEN SHE in Chinese 0653 GMT 9 Jul 87

[Text] Beijing, 9 July (ZHONGGUO XINWEN SHE)--China recently developed the latest model Changcheng-286 advanced Chinese-English microcomputer, and began to sell this model today in six cities, namely, Beijing, Tianjin, Shanghai, Chengdu, Changsha, and Shenzhen. This model computer is now being produced in large quantities.

At a press conference today, a responsible person of the China Computer Development Corporation said that the independent development of production of this computer model, as an item of research achievement, signals that the technological properties of China-made microcomputers have reached the world's advanced level in the mid 1980's.

The Changcheng-286 microcomputer is a key item in the state's scientific research projects during the Seventh 5-Year Plan, and it is completely compatible to mainstream products worldwide. Because advanced technology was adopted when designing this computer, its system setup, Chinese character and graph handling, other properties, and price all reach the same level, or even outdo, products of the same kind produced by other countries. So it will have good market prospects.

This high-class computer model has been exhibited at international exhibitions in the United States, Thailand, Singapore, and the FRG, and has attracted attention from manufacturers and users in foreign countries. Now, more than 10 foreign companies have signed agreements to act as agents for this computer model, and a quantity of products have entered international markets.

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## NATIONAL DEVELOPMENTS

### FORCES CONCENTRATED TO PROMOTE CAD TECHNOLOGY

HK030849 Beijing CHINA DAILY (BUSINESS WEEKLY Supplement) in English  
3 Aug 87 p 1

[Article by staff reporter Zhang Yu'an]

[Text] Efforts are being made to make full use of China's high-tech research in universities to promote the development of computer aided design (CAD) technology.

This has already been applied in China in the fields of petroleum, chemistry, machine building, urban construction, transportation, metallurgy, electronics, computer, ship-building and colleges and institutes.

Two companies are to develop CAD technology. One is the North CAD Company organized by the Ministry of Electronics Industry and Qinghua University in Beijing in April 1986. The other will be set up soon in Shanghai based on Shanghai Transport University.

The North CAD Company is now a bridge between research units and users of CAD. The company, with more than 30 staff, has strong support from some 30 research personnel from Qinghua University, more than 20 of whom are associate professors or senior engineers with the rest being college students or post graduates.

Up to now, 13 items of the company's CAD technology have been put into use, some of which are specially designed for use with the domestically-made Great Wall 0520 C-H and 286 computers

"Our CAD is designed for use with domestically-made computers, though it can also be used with foreign-made computers, because we want to promote the development of our own computer industry and our CAD programme directions are in Chinese, suitable to Chinese users," said an official from the Ministry of Electronic Industry.

But this does not mean that China will refuse to use foreign advanced technology and equipment. That is the only way to promote the development and utilization of its own computer industry.

The North CAD Company has a close relationship with Apollo of the United States, and also has links with Calma, Auto-Roe and Sun of the U.S. Now the company is negotiating with Sun on setting up a contractual or equality joint venture and is searching for a way to export technology or to undertake foreign development tasks, said Ban Li, its manager.

But there are still some problems in research on CAD, he said, while the North CAD Company is the first in China to specialize in research, production, sales and after-sale service in this field. China has about 145 enterprises and institutes, both large and small, which are involved in research and production of CAD. Redundant research and production even on basic topics was a serious problem, wasting personnel and material, said Lin Xianguang, associate professor of Qinghua University working for North CAD.

So the bureau of computers and information under the Ministry of Electronics Industry and China Computer Development Company organized China's first CAD Software Exhibition in Qinghua University on July 26 to 28.

More than 30 companies and institutes exhibited more than 60 types of CAD softwares for a variety of fields.

The exhibition aimed at finding promising products and avoiding duplication of research and production.

The North CAD Company will be a national CAD technology research and development centre in the future. Unlike South CAD Company in Shanghai which will specialize in the research and production of CAD software for the electronics industry, North CAD Company is concentrating on research and production of CAD software for architecture and construction.

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NEW FORM OF RESEARCH-PRODUCTION PARTNERSHIP

Beijing RENMIN RIBAO in Chinese 18 Apr 87 p 3

[Article by staff reporter Wang Yougong [3769 0645 1872]: "Another New Way To Integrate Research With Production"]

[Text] The Ministry of Metallurgical Industry's Central Iron and Steel Research Institute with a fairly strong technological staff has run an experimental steel tube plant jointly with the Haidian District of Beijing Municipality. The experiment has quickened the application of technological achievements to production and brought economic gains to both partners. The plant has overcome difficulties and produced some new products in small batches to meet urgent demands.

The Central Iron and Steel Research Institute, which turns out more than 100 technological achievements each year, planned to set up a pilot plant in 1980 to shorten the time needed to translate technological achievements into productive forces. An estimated minimum investment of 5 million yuan was required. It was nearly impossible to raise so much money in a short time, and construction would take at least 4 or 5 years. At this juncture, the institute learned that the Haidian District agricultural machinery plant, with nearly 300 workers and more than 1.8 million yuan in assets, was on the verge of bankruptcy. After negotiations, the two sides decided to pool their resources and set up a plant jointly. Profits would be divided in proportion to shares. The research institute would provide the technologies to manufacture many kinds of seamless steel tubes in urgent demand.

The "risk-and-profit-sharing" research-production partnership developed in the first year the capacity to produce 200 tons of precision seamless steel tubes annually, and a batch of urgently needed high-quality precision steel tubes was quickly put in the domestic market. In the 6 years since, more than 20 new varieties of steel tubes have been developed, and some have already been put in mass production. In the past, the Beijing civil aviation maintenance center had to spend a large amount of foreign exchange each year to import steel tubes for aircraft maintenance. As the steel tubes developed and produced by the joint steel tube plant have met the same standards as foreign products, the maintenance center now buys all the steel tubes from the plant, putting an end to imports altogether. In 1984, the 6,000-mm-long steel tube produced by the plant



was rated as a high-quality product of Beijing Municipality. Enterprises in 28 provinces, municipalities, and autonomous regions are now using the plant's products.

In the past 6 years, this small plant has made a total profit of more than 4 million yuan and paid more than 1.3 million yuan in taxes. The Haidian District agricultural machinery plant's share of the profits totaled more than 2 million yuan, making the 6 years the most profitable period since its establishment. Comparing 1985 with 1979, before the start of the joint venture, the total amount of wages and bonuses for workers and staff members more than doubled. The plant has also invested nearly 1 million yuan in new equipment, workers' housing, and other welfare projects.

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SCIENCE FOUNDATION PROMOTES SEISMIC RESEARCH

Beijing GUANGMING RIBAO in Chinese 30 Apr 87 p 1

[Article by special reporter Jin Tao [6855 3447]: "Using the Economic Lever of Science Funds To Guide Scientific Research"]

[Text] The Joint Seismology Foundation was established in 1984 with the approval of the State Council Science and Technology Leading Group and funds raised jointly by the State Seismological Bureau and related institutions of higher learning. At a recently held enlarged board meeting of the foundation, this reporter learned that since its establishment, the foundation has used the economic lever of science funds to guide scientific research. Breaking the bounds of different trades and encouraging competition, funds are granted to the best applicants. The practice has effectively promoted basic theoretical seismic research. It is widely popular among scientific workers. It has blazed a new trail for reforming the S&T management system.

The foundation's purpose is to promote seismic research for the whole country. Scientists of all departments and units in all parts of China can apply for grants according to specific procedures. Applicants are treated equally without discrimination, and competition is encouraged, so that limited research funds can be put to best use. In the past 2 years and more, the foundation has organized nearly 100 experts and scholars from 50 units of 8 ministries and commissions to take part in the evaluation and examination of 251 research applications. Each research proposal is first subject to a correspondence review by five to seven highly qualified specialists in the relevant fields. The practice gives full scope to academic democracy and helps raise the standard of academic research.

The foundation system has paid off in scientific achievements. In the past 2 years, the foundation has granted more than 5 million yuan to 127 basic, theoretical, and applied seismological research projects undertaken by units in all parts of the country. The 98 research projects which received grants in 1985 have already submitted 130 achievement reports, and more than 80 percent of the papers have been published at home and abroad.

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VITALITY OF SCIENTIFIC RESEARCH AT NANJING UNIVERSITY CITED

Beijing RENMIN RIBAO in Chinese 8 May 87 p 3

[Article by Jiang Hanzhen [5592 3211 4632] and Fang Yanming [2455 1693 2494]:  
"Integration of Scientific Research With Teaching at Nanjing University"]

[Text] The Nanjing University Medical College, established formally by approval of the State Education Commission in March this year, is now enrolling new students. It is the first medical college set up in a key university directly under the State Education Commission. Its establishment shows the vitality of this old university with its full range of disciplines and solid basic theoretical foundation and how it develops research results into new courses.

The university attaches great importance to organically integrating scientific research with teaching and has thus formed a benign cycle of progress in research, development of new courses on solid bases, and steady improvement of education quality. Generally the university embarks on a research program, preferably in conjunction with and backed by a major state research contract; an academic groundwork is laid; graduate students are enrolled and trained into teachers; and a new undergraduate course is established based on the need of the state. The university's department of environmental science was developed from major research projects it had undertaken for the state, including an environmental appraisal of Dukou City, a forecast on the impact of Changzhou's economic development on its environment, and countermeasures for environmental protection. The departments of biochemistry, biology, chemistry, physics, information physics [xinxi wuli], and so forth have done many years of research work in the fields of medicine, pharmacology, medical and pharmaceutical equipment and supplies, and medical use of a electronic linear accelerator, which naturally has become a solid foundation for a medical college. Dozens of new specialties established in the past few years at the university had all begun as research projects.

Research has contributed to the development of courses. Of the university's more than 1,100 undergraduate courses, more than one-half of the elective courses are based on research. The economics department has opened new courses on "socialist marketing" and "socialist political economy." According to teachers and students, classroom instruction would be

meaningless without timely studies on new problems that have cropped up in economic construction. The seven elective courses for the senior year of the information physics department are all derived from research. The students say: The courses are from the frontiers of knowledge. They are new and original and have a strong appeal.

Nanjing University pays attention to cultivating the students' talents with scientific methods and encourages them to do research work. It is a university policy that "students may join teachers in research and carry out specific research tasks; they may cooperate with each other to carry out research projects for industrial and mining enterprises; and they may conduct urban and rural economic and social surveys and engage in other professional practices, and turn in special survey reports. These and other similar research projects should be appraised by teachers, and credits will be given if they are up to standards." During holidays, 14 students of the biology and geography departments conducted a comprehensive survey and wrote a report on the ecological environment of giant pandas in Sichuan's Baoxing County, for which they won Jiangsu Province's special social practice award for university students. To encourage creativity, the university spends a considerable amount of money to provide space and conditions for students to publish academic articles. Three issues of "Nanjing University Students' Writings" have been published, including 75 academic articles totaling more than 500,000 words. The third issue also includes summaries of the articles in English. The publications are used in exchanges with other Chinese universities and will be used with well-known foreign universities which have S&T exchange agreements with Nanjing University. A "new star science award" for graduate students was established last year, and 40 have won this honor.

The abundance of scientific research activities fosters a sound academic environment and fundamentally improves the quality of education. In 1986 alone, the university sponsored more than 30 lecture series on such topics as "meeting the challenge and marching into the future," "traditional culture and modern civilization," "system, objectives, modernization," and so forth, and some 80,000 people attended the lectures.

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XI'AN, GUANGZHOU RELAX S&T PERSONNEL MANAGEMENT

Beijing GUANGMING RIBAO in Chinese 15 Apr 87 p 2

[Text] Following the issuance of "the State Council's provisions for further reforms of the S&T management system," Xi'an and Guangzhou cities have formulated tentative plans on reforming the S&T personnel management system in light of local conditions. A summary follows:

1. S&T personnel, organized by their units, collectively or individually, are encouraged and supported to contract, lease, or otherwise take over small and medium-sized enterprises and rural township enterprises, or to set up various types of S&T organizations.

Under the Xi'an plan, for S&T personnel who are organized by their units, the contract income is divided as follows: 50 percent goes to the unit's contract fund; 20 percent goes to collective welfare; and 30 percent goes to the contractors, in addition to their bonuses. For the collective unit contractor (the contractor is itself an enterprise, for example), if the net annual income is under 200,000 yuan, it will be retained by the unit to meet various expenses, and any income in excess of 200,000 yuan will be taxed according to law. Under the Guangzhou plan, individual contractors keep all the income, after payment of taxes according to state regulations. They can open bank accounts and withdraw cash.

2. S&T personnel can be selected by their units to work elsewhere, or they can take leave or resign.

In Xi'an, S&T personnel will in most cases be selected by their units to take another job. They can be loaned or permanently transferred to another unit. The new job can be a contract to tackle a specific technological problem, or work with a technical service team. A person can be loaned to another unit for 1 to 3 years. During this period, in addition to paying the person's wage, bonus, and technical, living, and travel allowances, the new unit will also pay the person's original unit a specific amount of retirement insurance premium ranging from 50 to 100 percent of his original wage. A person who is on loan to another unit will continue to receive the same treatment as the workers and staff of his original unit in longevity, promotion, housing, and so forth. A person who is permanently transferred from a state-owned unit to a

collectively owned unit will be allowed to retain his state-owned status and will be given a one- or two-grade wage increase. S&T personnel who have been transferred to township enterprises for more than 1 year and have made real contributions, and those who have been transferred to rural and mountainous areas, can have their families' rural household registration changed to urban household registration, on condition that they themselves will not go elsewhere for 5 years.

S&T personnel can take leave with or without pay for a maximum of 3 years. Those on leave without pay should pay occupational insurance premiums to their original units during their absence. In Xi'an, the rate is 50 percent of their original wages or 10 percent of their current total income. There is no premium for those working in poor mountainous areas. The premium for those on leave with pay should be more than their original wages, at a progressive annual rate of 150, 200 and 250 percent of their original wages, or about 60 percent of their current total income. At the end of their leave, they can resign, negotiate a new contract, or return to their original units. Those who request to return to their original units must be accepted by their original units. During their absence, they retain their housing privileges with their original units. If they are injured or killed while on duty, all expenses will be paid by the enterprises they worked for at the time of injury or death.

Those who want to resign should submit their requests 2 months in advance and obtain their units' approval. In Xi'an, they will be given a lump-sum severance pay equal to 1 month's pay for each year of service. If they are hired by a state-owned unit, their previous length of service will be recognized, but they have to turn in their severance pay. After their resignation, they can keep their housing units for 2 to 3 years. After this grace period, they will be requested to pay additional rent, or assigned new housing on a priority basis by their new employers, or given priority in buying new homes on their own. The employment system for professional and technical personnel applies equally to those who have resigned from their former jobs. Those who have made important contributions can be hired directly for professional or technical jobs, or have their qualifications for a job confirmed by the relevant authorities. In Guangzhou, the S&T personnel who have resigned to work in rural areas are allowed to carry over their length of service, retain their urban household registration, and have their administrative and personnel records kept at the district or county science and technology commissions or township enterprise administrative bureaus. If they fail in their new undertakings, they may apply for new jobs, and when approved, they should return the severance pay to their new employers.

3. The initial capital needed to contract for, take over, or set up various types of enterprises can be raised by applying for bank loans, recruiting worker-shareholders, public fundraising, and so forth. Guangzhou city also allows the use of the city's S&T development fund for the development and application of technological achievements.

4. The S&T personnel who have contracted for, taken over, or set up individual or collective enterprises can decide on their own personnel, financial, material, and operational matters and wage and award standards.

## NATIONAL DEVELOPMENTS

### BRIEFS

QINGHUA UNIVERSITY RESEARCH--Qinghua University, which observed its 76 birthday on 26 April, is attracting attention by its changing face. It is now not only a top educational center in China, but gradually becoming a scientific research and technological development center. According to statistics, of the results of 167 research projects, which have been appraised and reported by the school in 1986, 56 are up to international standards, and 40 are the first of their kind in China. The school completed 476 technological development projects in 1986, which accounted for 52 percent of its research projects. The successful development of the "16K static MOS random member" by Qinghua's Microelectronics Research Institute has brought China's electronics industry into the advanced field of extra-large-scale integrated circuits. The "radar programmable numerical signal processor," "artificial heart valve performance monitoring technology," and other trailblazing achievements of the radio and mechanics departments are spoken highly of by Chinese and foreign experts. At the same time, Qinghua has lost no time in applying its technological achievements to national economic development with good economic and social results. [Text] [Beijing GUANGMING RIBAO in Chinese 27 Apr 87 p 1] 12802/9190

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PHYSICAL SCIENCES

BREAKTHROUGH IN COMPOSITE MATERIAL RESEARCH ANNOUNCED

Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 1 Apr 87 p 4

[Text] It is learned today from the work conference of key state laboratories currently being held in Beijing that the Wuhan Industrial University has made a major breakthrough in the research on the fusion of ceramic and metallic materials, which is followed with interest and highly appraised by experts in the same field.

In the past year, the university's laboratory for new material composition technology, led by Professor Yuan Runzhang [5913 3387 4545] who is also the university's president, has put forward new ideas and processes for the formation of composite nonmetallic and metallic materials and achieved important results in research on high-temperature construction materials, hard antifriction materials, and new special corrosion-resisting materials.

Yuan Runzhang told this reporter: "It can be predicted that the new composite materials we are developing will have a bearing on the aerospace, sea transportation, machine-building, chemical, petroleum, power, and communications industries."

Yuan Runzhang explained that the nonmetallic materials referred to here are mainly ceramic materials. These materials have high melting points, strength, and hardness, but they are also brittle. Metallic and alloy materials have high electrical and heat conductivity, high tensile strength, and good plasticity, but are poor in refractory and corrosion-resisting properties. We are now combining the advantages of ceramic and metallic materials into one from their chemical structures. This kind of work will bring major changes to material research and accelerate developments in many industrial fields.

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